

# **EXHIBIT 5**

**MCWP 3-15.3 (formerly FMFM 1-3B)**

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# **Sniping**

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**U.S. Marine Corps**

PCN 143 000118 00

MCCDC (C 42)  
27 May 2004

E R R A T U M

to

MCWP 3-15.3

SNIPING

1. Change the publication short title to read "MCWP 3-15.3" (vice FMFM 1-3B). Change PCN to 143 000118 00.

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DEPARTMENT OF THE NAVY  
HEADQUARTERS UNITED STATES MARINE CORPS  
WASHINGTON, D.C. 20380

28 January 1981

FOREWORD

1. PURPOSE

FMFM 1-3B, *Sniping*, sets forth the techniques and procedures for selecting, training, and employing scout-snipers within the Fleet Marine Forces.

2. SCOPE

FMFM 1-3B complements, and is designed to be utilized with, FMFM 1-3, *Basic Rifle Marksmanship*, and FMFM 1-3A, *Field Firing Techniques*. This manual addresses the scout-sniper's selection, training, and equipment and its care. It also provides guidance in the proper and effective methods of employment of scout-snipers.

3. SUPERSESSION

FMFM 1-3B, *Sniping*, dated 7 April 1976.

4. CHANGES

Commanding General  
Doctrine Division (C 42)  
Marine Corps Combat Development Command  
2042 Broadway Street Suite 210  
Quantico, VA 22134-5021

5. CERTIFICATION

Reviewed and approved this date.

BY DIRECTION OF THE COMMANDANT OF THE MARINE CORPS

A handwritten signature in black ink, appearing to read "Richard E. Carey", is written over the printed name.

RICHARD E. CAREY  
Lieutenant General, U.S. Marine Corps  
Commanding General  
Marine Corps Development and Education Command  
Quantico, Virginia

DISTRIBUTION: TAE

Reviewed and approved for  
reprinting by CMC (Code PP)  
on 17 JAN 1984.

## User Suggestion Form

From:

To: Commanding General, Doctrine Division (C 42), Marine Corps Combat Development Command, 2042 Broadway Street Suite 210, Quantico, Virginia 22134-5021

Subj: RECOMMENDATIONS CONCERNING FMFM 1-3B, *SNIPING*

1. In accordance with the foreword to FMFM 1-3B, which invites individuals to submit suggestions concerning this FMFM directly to the above addressee, the following unclassified recommendation is forwarded:

Page	Article/Paragraph No.	Line No.	Figure/Table No.
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Nature of Change:

- ☐ Add
- ☐ Delete
- ☐ Change
- ☐ Correct

2. Proposed new verbatim text: (Verbatim, double-spaced; continue on additional pages as necessary.)

3. Justification/source: (Need not be double-spaced.)

Note: Only one recommendation per page.

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RECORD OF CHANGES

CHANGE No.	DATE OF CHANGE	DATE OF ENTRY	ORGANIZATION	SIGNATURE

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## **SECTION 1**

### **THE SCOUT-SNIPER**

The Marine Corps sniper is a Marine who has been carefully screened, selected, and has undergone comprehensive training in advanced infantry and marksmanship techniques. The sniper's training, combined with the inherent accuracy of his rifle, firmly establishes him as a valuable addition to the supporting arms available to the infantry commander.

#### **101. DEFINITION**

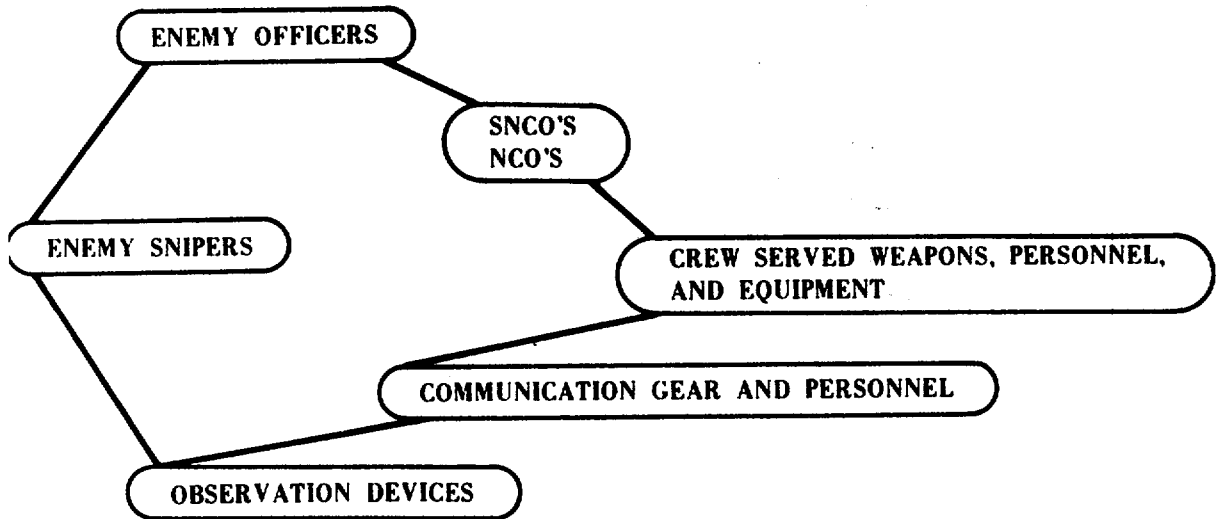
The scout-sniper is a Marine highly skilled in fieldcraft and marksmanship who delivers long range, precision fire at selected targets from concealed positions.

#### **102. DUAL MISSION**

The primary mission of a sniper in combat is to support combat operations by delivering precision fire on selected targets from concealed positions. The sniper also has a secondary mission of gathering information for intelligence purposes.

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**Selected Targets.** Those targets that will have a definite influence on the outcome of the battle and the enemy's ability to wage battle, such targets as:



### 103. OPERATIONAL CONCEPT

A *two-man team* is the basic operational organization for the employment of snipers. *Both* team members are trained scout-snipers with the additional MOS of 8541.

### 104. SNIPER TEAM

Each sniper team consists of a team leader and a scout-sniper. Both are trained 8541's. Each team is equipped with:

- M40A1 sniper rifle with a UNERTL 10X telescope
- Standard M16 service rifle
- M49 20X spotting scope
- Wide-angle binoculars with mil scale
- .45 caliber service pistols
- Starlight scope if necessary
- Radio

Either member of the team can fill the function of the sniper (with the M40A1 sniper rifle); the other member is armed with the standard service rifle and fills the function of the observer.

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Besides actual sniper skills, the sniper team is additionally trained in:

**SUPPORTING ARMS FIRES PLANNING AND CONTROL**

**INFANTRY TACTICS**

**MAP AND AERIAL PHOTO READING/  
LAND NAVIGATION**

**INFORMATION GATHERING  
AND REPORTING**

**COMMUNICATIONS/ZONE BRIEFS**



Figure 1-1. Sniper Team Leader Calling in Support.

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105. ORGANIZATION

Sniper teams are currently maintained on an additional/collateral duty basis within the infantry battalions. There is a *contingency plan* for sniper billets at the regimental level as well.

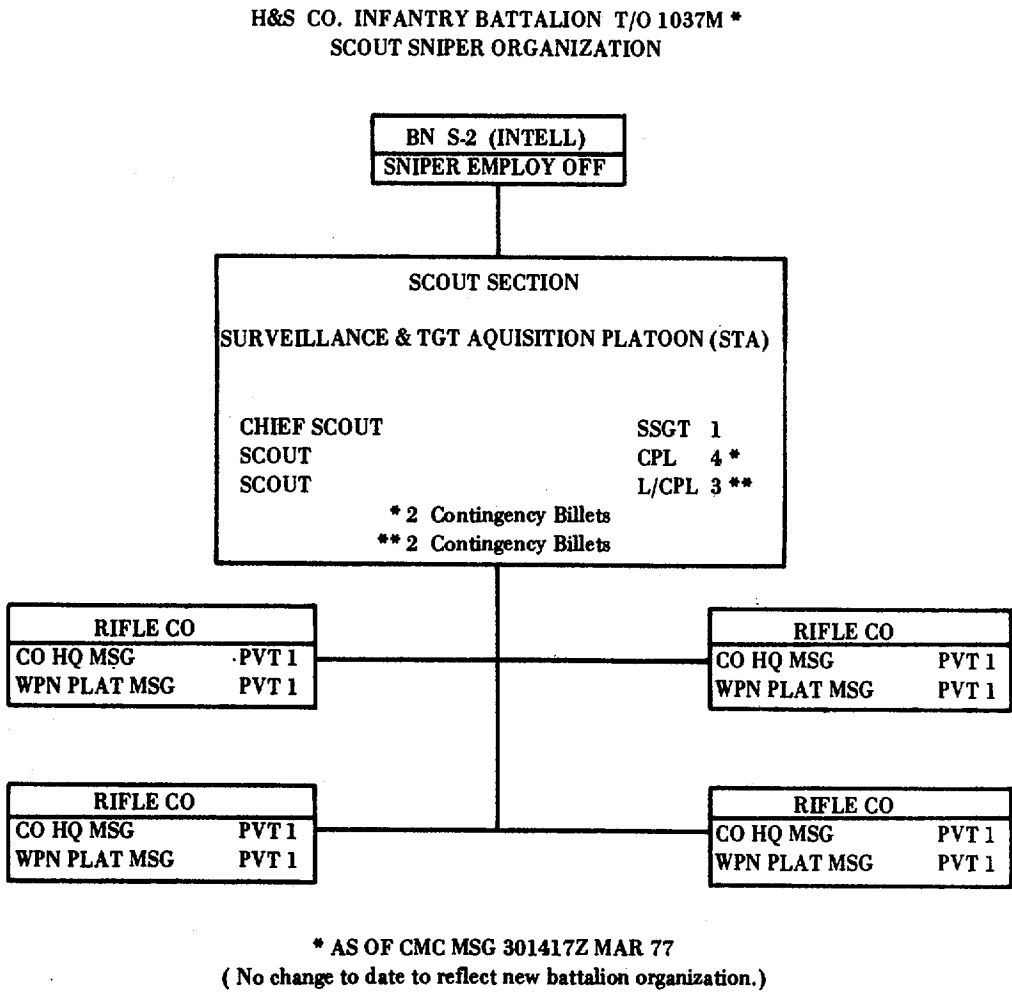
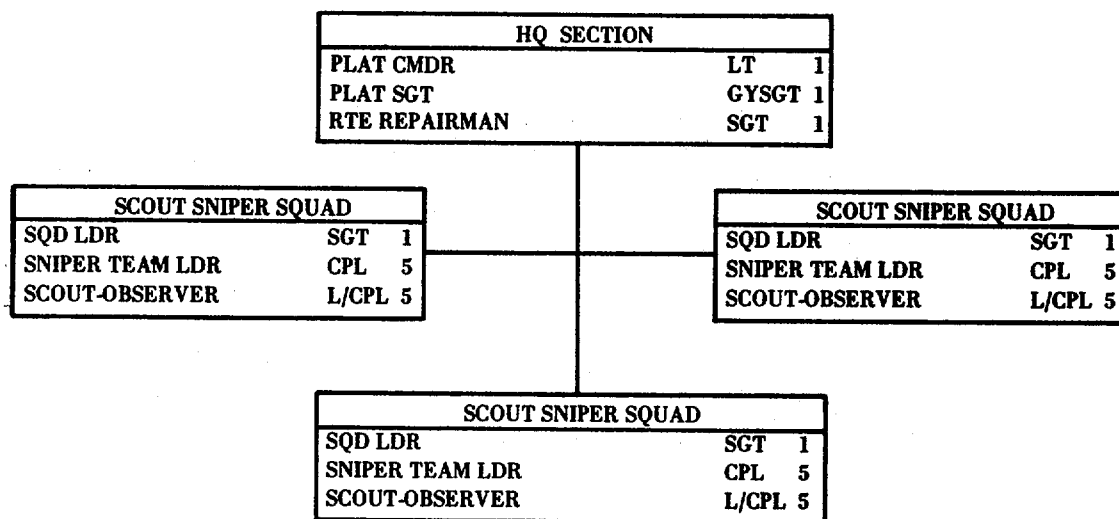


Figure 1-2. Scout Sniper Organization.

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# **SNIPER ORGANIZATION CONTINGENCY MANNING**

**HQ CO. INFANTRY REGIMENT T/O 1096M \*  
SCOUT SNIPER PLATOON**



\* CONTINGENCY MANNING

Figure 1-3. Scout Sniper Platoon.

## **106. DUTIES**

The *sniper employment officer* is directly responsible to the battalion commander for the operational efficiency of his designated sniper teams. He advises the battalion and company commanders on the correct employment of their sniper teams. He ensures that proper maintenance and security is provided for sniper weapons and equipment.

SNIPER RIFLE SYSTEMS ARE TO BE USED BY SNIPERS  
FOR SNIPING AND SNIPER PROFICIENCY TRAINING  
ONLY. UNTRAINED PERSONNEL SHOULD NOT  
HANDLE OR MANIPULATE THE RIFLE OR THE  
TELESCOPE.

The *sniper team-leader* is responsible for the effective employment of his team and the care of its weapons and equipment. When attached, he assists the commander of the supported unit in the control of the team and makes recommendations relative to proper sniper team employment.

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Figure 1-4. Sniper Team Briefing.

## 107. SELECTION OF PERSONNEL

Candidates for sniper training must be carefully screened. The rigorous training program and the great personal risk in combat require high motivation and the ability to learn a variety of highly technical skills. Potential snipers must have an excellent record and *must be carefully screened* by their unit commanders to determine their potential aptitude as a sniper.



Figure 1-5. Selecting a Sniper.

Battalion and company commanders must ensure that *only the best Marines* are selected for sniper training. Anything less than the best will not be able to meet the graduation standards of the sniper course and will waste valuable Marine Corps time and money.



No commander likes to send his best people to fill a school quota (especially since he may lose that Marine to battalion when referring to a platoon or company commander). The commander must look at the larger picture of helping his battalion and the Marine Corps by giving them the asset of a valuable, highly trained, supporting arm. The commander's loss is the battalion's and Marine Corps' gain. Select only the best—quota fillers are not acceptable!

### REQUIREMENTS FOR POSSIBLE SNIPER CANDIDATES:

#### PHYSICAL CONDITION

- FIRST CLASS PFT SCORES
- STAMINA
- ATHLETE/COORDINATION

#### INTELLIGENCE

- MUST BE ABLE TO LEARN, APPLY, AND TEACH A WIDE VARIETY OF TECHNICAL SKILLS
- DECISIVENESS
- KNOWLEDGE OF INFANTRY TACTICS/SKILLS
- COMMON SENSE/INGENUITY

#### EQUANIMITY

- NO UNCONTROLLED EMOTIONS
- CALM UNDER STRESS

#### LEFT HANDED

- LIABILITY UNLESS HIGHLY QUALIFIED

#### TOBACCO HABIT

- LIABILITY UNLESS HIGHLY QUALIFIED

#### MENTAL CAPABILITY

- THINKS FOR HIMSELF
- SELF-CONFIDENCE
- ABILITY TO BE EMPLOYED INDEPENDENTLY
- MATURE

#### GLASSES

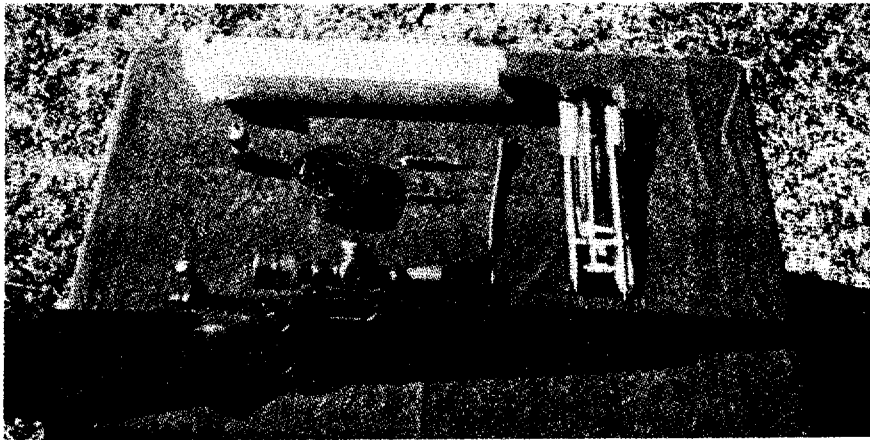
- LIABILITY UNLESS HIGHLY QUALIFIED

#### MARKSMANSHIP

- REPEATED ANNUAL REQUAL OF EXPERT

#### FIELD CRAFT

- AT HOME IN THE FIELD
- BACKGROUND IN THE WOODS
- CONFIDENCE WITH MAP AND COMPASS



## SECTION 2

### SNIPER EQUIPMENT

#### 201. RIFLE, M40A1

The sniper rifle used by the Marine Corps is a Marine Corps designed and produced bolt action, 7.62mm rifle with a stainless steel barrel for improved accuracy. It weighs 14 pounds and has a maximum effective range of 1,000 yards. The rifle is fitted with a top-mounted telescope base, to which the sniper scope can be readily attached without special tools. The rifle is furnished with a lightweight fiberglass carrying case with force fitted sponge rubber top and bottom liners.



The safety lever is located at the right rear of the receiver, behind the bolt handle. When pulled to the rear, the weapon is on safe.

Figure 2-1. Location of the Safety.



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The bolt stop release is located inside the trigger guard just forward of the trigger. When depressed, it allows the bolt to be removed from the rifle.

The floor plate latch is forward of the trigger guard and is opened by pressing the serrated detent on the forward edge of the trigger guard.

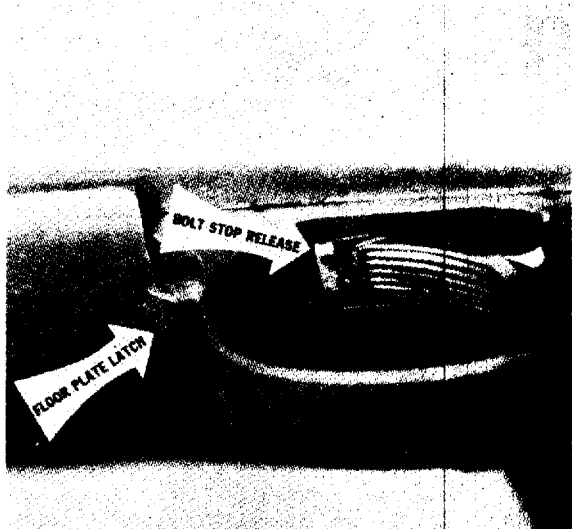


Figure 2-2. Bolt Stop Release and Floor Plate Latch.

**TABULATED DATA  
M40A1 RIFLE**

Caliber . . . . .	.7.62mm NATO
Length . . . . .	.44 inches
Weight . . . . .	.14 pounds
Barrel Length . . . . .	.24 inches
Lands and Grooves . . . . .	.6
Twist, Right Hand . . . . .	.1 turn in 12 inches
Trigger Weight. . . . .	.3 to 5 pounds
Torque . . . . .	.65 inch/pound
Magazine Capacity . . . . .	.5 rounds
Maximum Effective Range. . .	.1,000 yards

**202. TELESCOPIC SIGHT**

A telescopic sight is an instrument which facilitates accurate aiming by use of precision ground lenses and crosshairs in a metal body.

**GENERAL**

**THE OPTICAL SYSTEM**

The optical system is composed of a series of glass lenses which transmit and magnify the image of the target to the sniper.

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The average unaided eye can distinguish 1-inch detail at 100 yards. Magnification, combined with good optics design, permits resolution of this 1-inch divided by the magnification. Thus, 1/10-inch detail can be seen at 100 yards with a 10X scope.

### LENS COATING

Field of view is the diameter of the picture seen through a scope, and it is usually expressed in "feet at hundreds of yards."

### MAGNIFICATION (Resolving Power)

Lens surfaces are coated with a high efficiency, low reflection (HELRL) film. This coating increases the light gathering capability to approximately 91 percent of the available light. With uncoated lenses, 45 percent of the available light is lost in the scope.

### FIELD OF VIEW

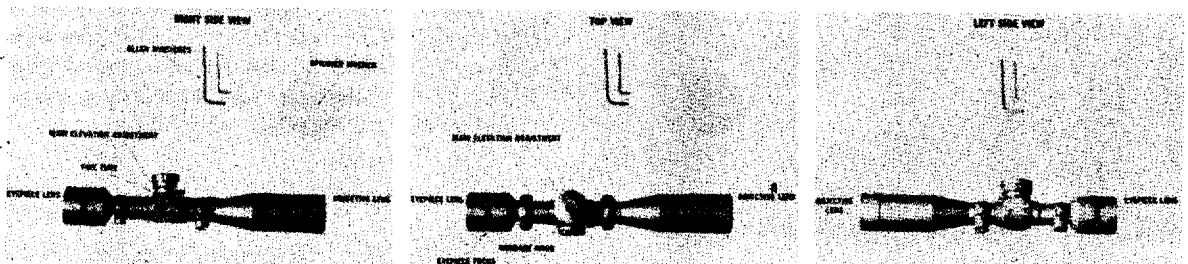


Figure 2-3. UNERTL Sniper Scope.

### UNERTL USMC SNIPER SCOPE TABULATED DATA

Weight . . . . .2 pounds 3 ounces  
 Length . . . . .12½ inches  
 Magnification . . . . .10X  
 Eye Relief . . . . .3 inches (fixed)  
 Adjustments:  
   Elevation and Windage . . . . ¼ minute  
   Main Elevation . . . . .Ballistic comeups M118 Lake City; match ammunition  
     7.62mm caliber); built-in  
   Fine Tune Elevation . . . . .+ or -3 minutes to adjust for differences in shooter's zeros,  
     temperatures, ammunition lots, ammunition  
   Windage . . . . .60 minutes main adjustment; + or -4 minutes with stops on  
     either end to allow shooter to run windage on and off in  
     the dark  
 Reticle . . . . .Mil dot duplex for range estimation and calculating leads on  
     moving targets  
 Lenses . . . . .HELRL coating; scope gathers in over 90 percent of available  
     light  
 Steel tube with dull black chrome finish.  
 Capability of reading elevation and windage settings from the rear while shooting.  
 Scope allows shooter to shoot point of aim/point of impact back to 1,000 yards.  
 Capability of adjusting parallax.

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## ADJUSTMENTS

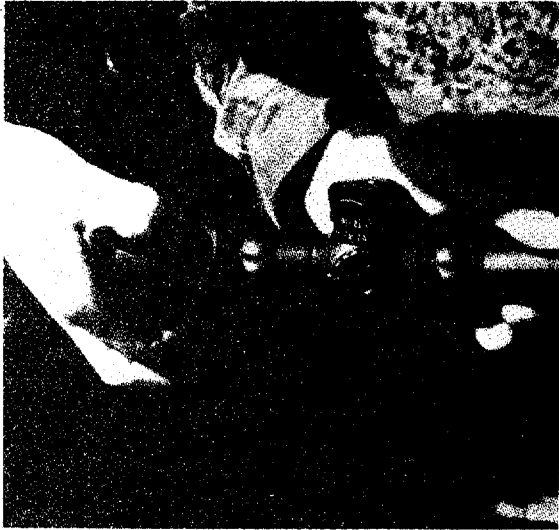
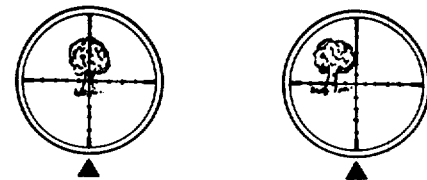


Figure 2-4. Focus Ring Being Rotated.

## PARALLAX

Parallax is defined as the apparent movement of an object as seen from two different points not on line with the object. Observe a target at a range of 300 yards. While looking through the scope, move the head vertically and horizontally in small increments. The reticle should not appear to change position on the target. If it does, parallax is present and the objective lens must be focused.



WHEN THE EYE IS CENTERED IN THE SCOPE AND THE CROSSHAIR APPEARS CENTERED ON THE OBJECT THEN YOU MOVE YOUR HEAD SLIGHTLY TO THE LEFT AND THE OBJECT MOVES OFF CENTER OF THE SCOPE PARALLAX IS PRESENT. NO PARALLAX IS PRESENT WHEN THE HEAD CAN BE MOVED SLIGHTLY IN ANY DIRECTION AND THE CROSSHAIR STAYS CENTERED ON THE OBJECT.

Figure 2-5. Test for Appearance of Parallax.

### PARALLAX ADJUSTMENT

To focus the objective lens, first loosen the lock ring at the end of the scope using the proper "spanner" wrench. Loosen this ring only enough to allow the focusing ring adjacent to it to rotate. To focus, rotate the focus ring with one hand, while holding the lock ring with the other to prevent its rotation and to keep it tight against the focus ring. After the focus has been set, tighten the lock ring using the "spanner" wrench while holding the focusing ring with the hand.

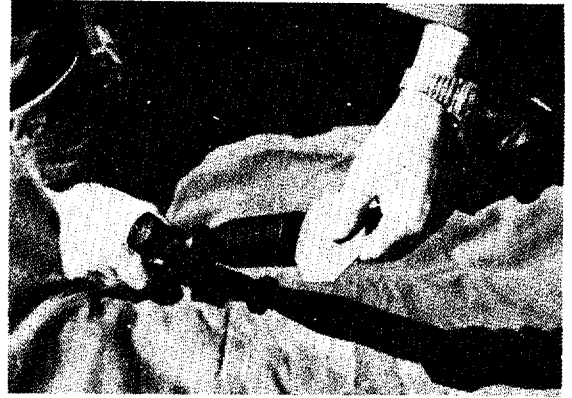


Figure 2-6. Adjusting Parallax With "Spanner."

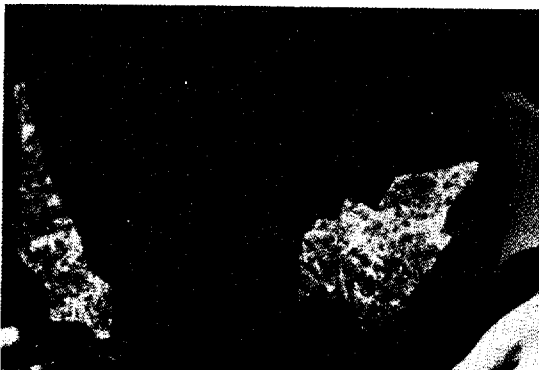


Figure 2-7. Focusing Objective Lens.



Figure 2-8. Final Stage of Focusing Objective Lens.

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Figure 2-9. Eye Relief.

### EYE RELIEF

When issued, the telescope is set all the way forward in the scope mounting rings. This setting will provide the needed 2- to 3-inch eye relief for almost all shooters. It is possible, however, to move the sight slightly to achieve proper eye relief.

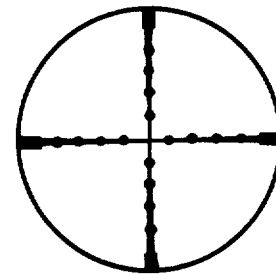
**CAUTION:** The telescope extends to the rear of the receiver. If proper eye relief is not maintained, recoil may cause the shooter to receive a blow on the forehead.

### THE RETICLE

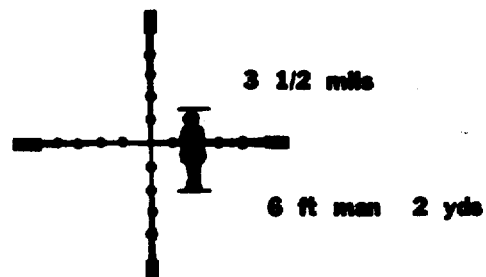
The duplex reticle in the telescope provides the sniper with a range-finding capability. To determine range, the following formula is used:

$$\frac{\text{Height of target (in yards)} \times 1,000}{\text{Height of target (in mils)}} = \text{Range}$$

The dots on the fine crosshairs are 1 mil apart with a total of 5 mils from the center to the thick post in each direction.



1 mil on the reticle is equal to 1 yard at 1,000 yards



$$\frac{2 \times 1000}{3.5} = 571 \text{ yds}$$

Figure 2-10. Mil Dot Reticle.

### ELEVATION AND WINDAGE

Once the scope is zeroed, all the sniper has to do is estimate the range to a target and the windage, and apply those figures to the scope via the main elevation adjustment and the fine tune windage adjustment.

***THE SCOPE WILL ALLOW THE SNIPER TO SHOOT POINT OF AIM / POINT OF IMPACT BACK TO 1,000 YARDS.***

The main ballistic comeups (for the M118-Lake City Match-7.62mm ammunition) are built into the main elevation adjustment. Once the scope is zeroed, the sniper has simply to dial the desired range on the scope and fire. The main adjustment on the elevation control is marked every 100 yards from 100 to 1,000 yards. For ranges between these figures (example 650 yards), set the dial halfway between 600 and 700 yards. There is also a fine tune elevation control + or -3 minutes to allow for different temperatures, ammunition lots, types of ammunition, and differences in shooters' zeros. The fine tune knob will allow any sniper to shoot point of aim/point of impact back to 1,000 yards.

The windage fine tune knob allows the sniper to apply changes to allow for windage variations of + or -4 minutes.

The scope settings for elevation and windage can be read from the rear while firing, and due to the distinctive clics and built-in stops, on all controls, the sniper can apply his elevation and windage in the dark.

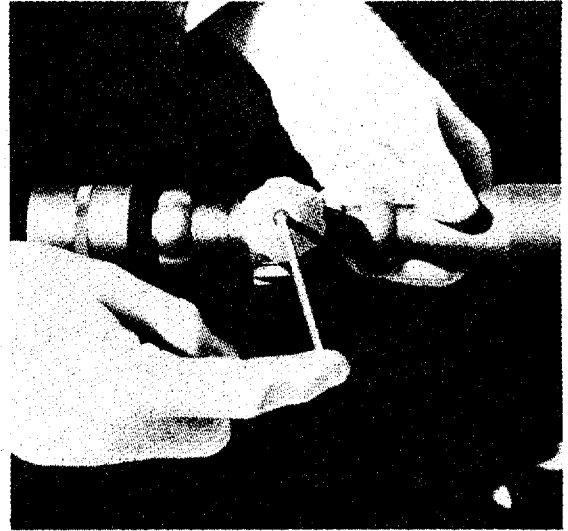


Figure 2-11. Elevation Adjustment Controls.

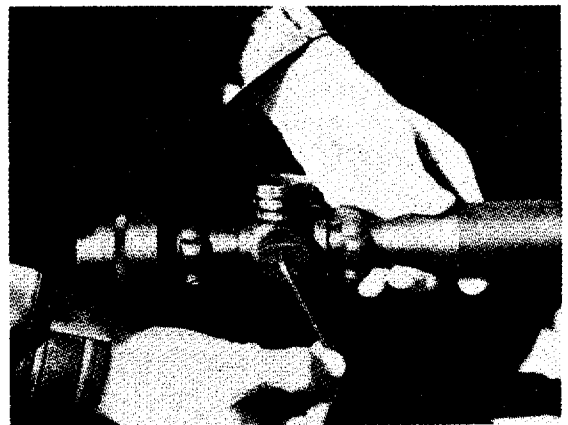


Figure 2-12. Windage Adjustment Controls.

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## MOUNTING THE TELESCOPE



Figure 2-13. Mounting Scope Sequence (Step 1).

The telescopic sight mount is attached to the rifle by three screws. The forward end of the mount is recessed to accommodate the lug which protrudes from the front mounting ring of the telescope.

The lug and recess are mated with the telescopic sight at a 90-degree angle to the weapon.

The scope is rotated and the eyepiece is brought to the rear until the scope and mount are aligned.

The rear mounting lug is fastened to the mount by means of lock screws on either side of the lug.

These screws also serve as a means for making coarse windage adjustments when zeroing.



Figure 2-14. Mounting Scope Sequence (Step 2).



Figure 2-15. Mounting Scope Sequence (Step 3).

## 203. AMMUNITION

Match quality ammunition will normally be issued because of its greater accuracy and reduced sensitivity to the wind. However, if match ammunition is not available, or if the situation dictates, a different grade of ammunition may have to be used. In ammunition other than match, accuracy and point of impact may vary noticeably. Among different lots, an especially accurate lot can be identified through use, and it should be used as long as it is available.



Figure 2-16. M118 Match Ammunition.

### DATA MATCH AMMUNITION

#### 173-Grain Boattail Bullet

Velocity . . . . . 2,550 feet per second

Accuracy Specification. . . . . 3.5 feet mean radius at 600 yards

Caliber . . . . . 7.62mm M118

Identifiers . . . . . MATCH is stamped on the head, along with the year of production and the initials of the arsenal which produced it (e.g., L.C. identifies Lake City).

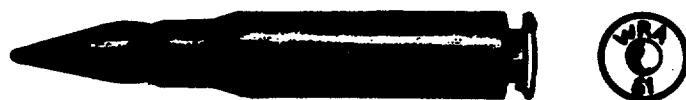


Figure 2-17. 7.62mm Ball Ammunition.

### DATA BALL AMMUNITION

#### 147-Grain Bullet

Velocity . . . . . 2,750 feet per second

Caliber . . . . . 7.62mm M80 and M80E1

Identifiers . . . . . The year of production and the arsenal's initials are stamped on the head.

**NOTE:** M80E1 is the most accurate of the ball ammunition.

Because MATCH ammunition is heavier and slower than the other types, it is safe to assume that all other types of ammunition will strike higher on the target.

**LAKE CITY M118 MATCH GRADE AMMUNITION WILL BE  
ISSUED TO THE SNIPER AND SHOULD BE FIRED AT ALL  
TIMES, WHEN AVAILABLE.**



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## 204. OBSERVATION AIDS

The sniper's success in detecting targets, or the signs of enemy presence, is dependent on his powers of observation. To increase his ability to observe well, he is aided by the use of the M49 telescope, binoculars, and the starlight scope. The starlight scope will be discussed in paragraph 205.

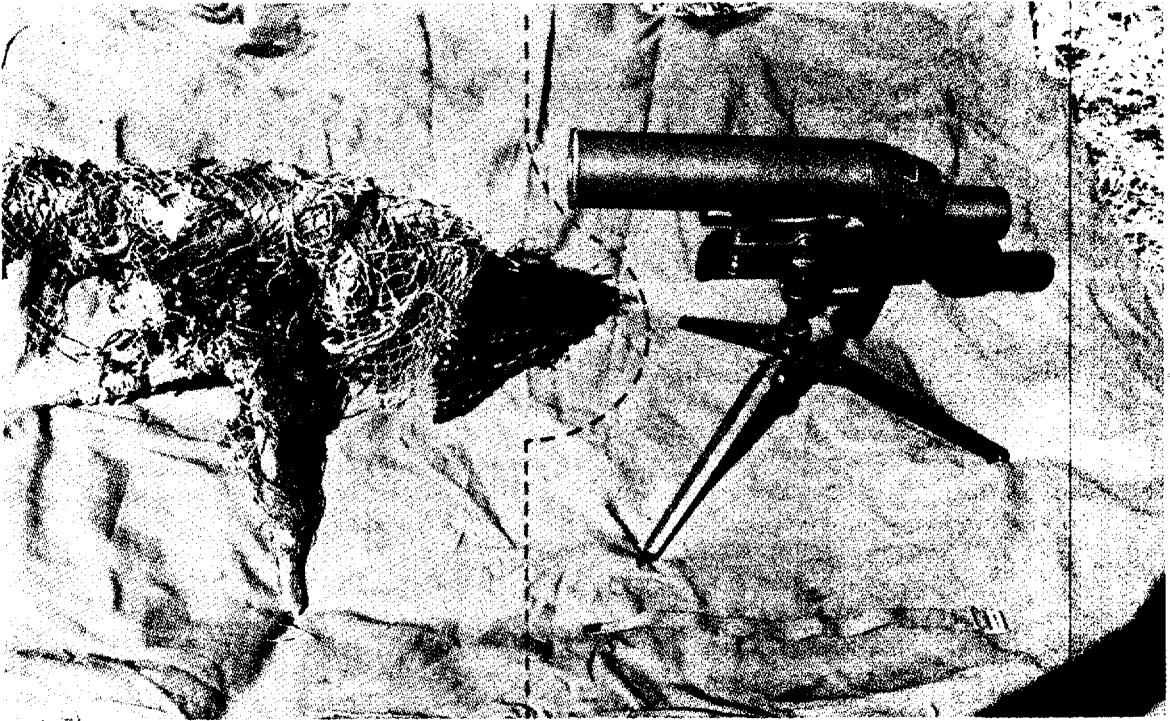


Figure 2-18. M49 Telescope and Tripod (Camouflaged).

Figure 2-19. M49 Telescope and Tripod.

### M49 OBSERVATION TELESCOPE

The M49 observation telescope is a prismatic optical instrument of 20-power magnification. The lenses are coated with magnesium fluoride for high light-gathering capability. The scope should be carried by sniper teams when it is justified by their mission. The high magnification of the telescope makes observation and target detection possible when conditions would otherwise prevent it. Camouflaged targets and those in deep shadows can be located, troop movements can be distinguished at great distances, and selected targets can be identified.

## **OPERATION**

An eyepiece cover cap and objective lens cover are used to protect the optics when the telescope is not in use. Care must be taken to prevent cross-threading of the fine threads.

## **FOCUS**

The eyepiece focusing sleeve is turned clockwise or counter-clockwise until the image can be clearly seen by the operator.

The height adjusting collar is to maintain a desired height for the telescope. The collar is held in position by tightening the clamping screw.

The shaft rotation locking thumb screw clamps the tripod shaft at any desired azimuth.

The elevating thumbscrew is used to adjust the cradle of the tripod, to increase or decrease the angle of elevation of the telescope.

The tripod legs can be held in an adjusted position by tightening the screw nut at the upper end of each leg.

## **SETTING UP THE SCOPE AND TRIPOD**

## **M15 TRIPOD**

Spread the legs and place the tripod on a level position on the ground so the cradle is level with the target area.

Place the telescope through the strip loop of the tripod and tighten the strap to keep the scope in place and steady.

If the tripod is not carried, an expedient rest should be used for the scope. The scope needs a good steady position if it is to be used properly.

Each sniper team will be equipped with binoculars to aid in observing the enemy and in searching for and selecting targets. The focusing adjustments are on each eyepiece. The left monocle has a mil scale etched into it.

## **BINOCULARS**

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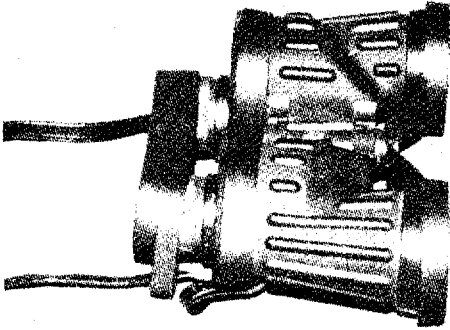


Figure 2-20. "New Issue" Binoculars.



Figure 2-21. Binoculars, Camouflaged.

#### METHODS OF HOLDING BINOCULARS



Figure 2-22. Method of Holding Binoculars.

Binoculars should be held lightly, resting on and supported by the heels of the hands. The thumbs block out light that would enter between the eye and the eyepiece. The eyepieces are held lightly to the eye to avoid transmitting body movement. Whenever possible, a stationary rest should support the elbows.

An alternate method for holding the binoculars is to move the hands forward, cupping them around the sides of the objective lenses. This keeps light from reflecting off the lenses, which would reveal the sniper's position.



Figure 2-23. Alternate Method for Holding Binoculars.

## ADJUSTMENTS

### *INTERPUPILLARY ADJUSTMENT IS MOVEMENT OF THE MONOCLES TO FIT AN INDIVIDUAL'S EYE*

The interpupillary distance is the distance between the eyes. The monoculars are hinged together so that they can be adjusted to meet this distance. The hinge is adjusted until the field of vision ceases to be two overlapping circles and appears as a single, sharply defined circle. The setting of the hinge scale should be recorded for future use.

### FOCAL ADJUSTMENT

Each individual and each eye of that individual requires different focus settings. Adjust the focus for each eye in the following manner:

- With both eyes open, look through the glasses at a distant object.
- Place one hand over the objective lens of the right monocular and turn the focusing ring of the left monocular until the object is sharply defined.
- Uncover the right monocular and cover the left one.
- Rotate the focusing ring of the right monocular until the object is sharply defined.
- Uncover the left monocular. The object should then be clear to both eyes.
- Read the diopter scale on each focusing ring and record for future reference.

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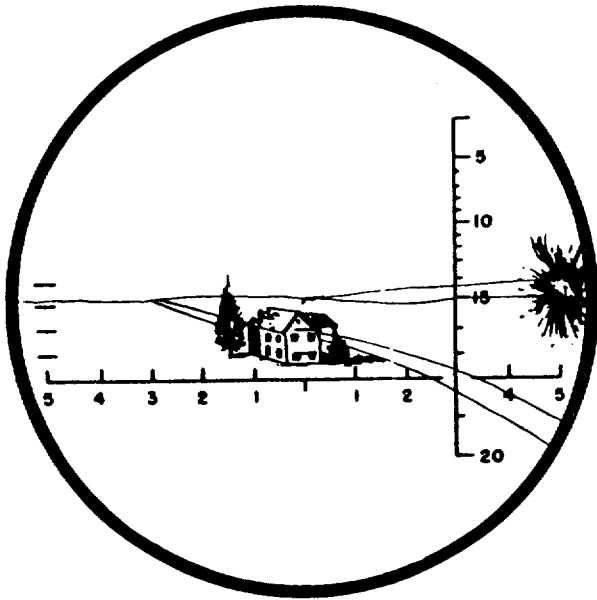


Figure 2-24. Binocular Reticle Pattern.

**RETICLE**

The mil scale that is etched into the left lens of the binoculars is called the reticle pattern and is used in adjusting artillery fire and determining range to a target. Determining range with the binoculars is done similar to the telescopic sight reticle. The height of the target is measured in mils. This is then divided into the height of the target in yards times 1,000 to give the range to the target in yards. Care should be taken to measure the size of the target to the nearest  $\frac{1}{4}$  yard.

In addition to observing and adjusting fire and range estimation, binoculars may be used to:

**ADDITIONAL  
USES FOR  
BINOCULARS**

- Identify troops, equipment, weapons, vehicles, etc.
- Observe enemy movement or positions.
- Locate targets.
- Make visual reconnaissance.
- Study terrain.
- Select routes and positions.
- Improve night vision.
- Improve vision in periods of reduced visibility.

Prolonged use of the binoculars or telescope will cause eye fatigue, reducing the effectiveness of observation. Periods of observation with optical devices should be limited to 30 minutes, followed by a minimum of 15 minutes rest.

**EYE FATIGUE**

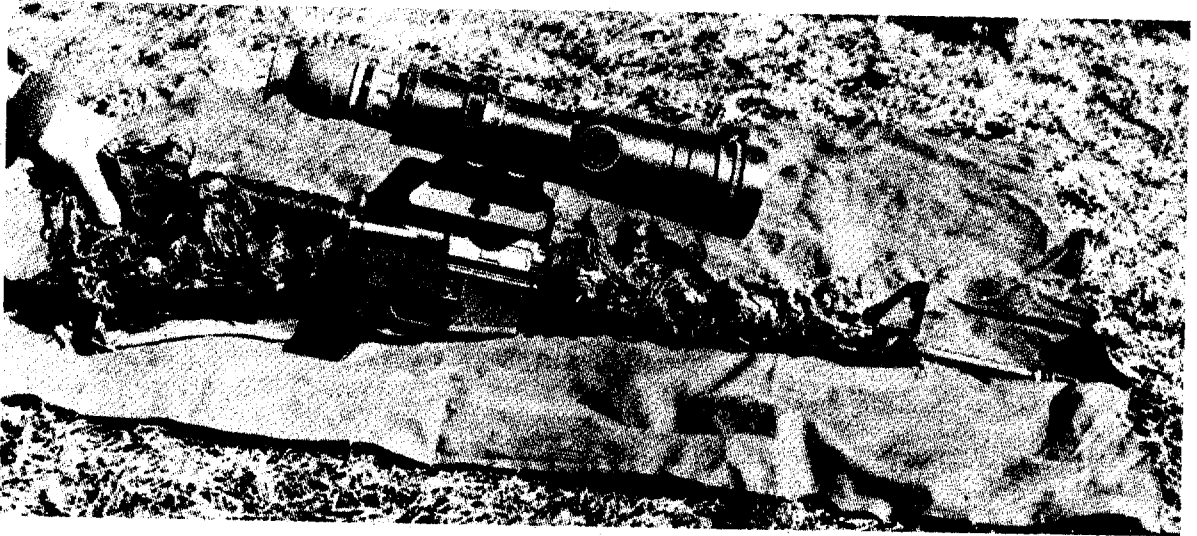


Figure 2-25. Starlight Scope.

## 205. STARLIGHT SCOPE

The starlight scope is a handheld, battery powered, electro-optical viewing device. The scope uses natural moonlight and/or natural starlight for target illumination. It detects distant and obscure objects at night by amplifying available ambient light to illuminate the objects to such a degree as to make them visible on a screen through the eyepiece. The starlight scope can be used for visual observation or for aimed fire of weapons at night while the user remains free of enemy detection.

The starlight scope is designed for use on the M14 and M16 rifles. Separate weapons adapter brackets are available for mounting the scope to each of these weapons. The starlight is not mounted on the sniper rifle since the effective range of a starlight scope is usually about 300 yards.

## APPLICATION



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The contents of the mercury battery are highly irritable to the eyes and to oral and nasal tissues; therefore, caution must be exercised when handling the batteries. To prevent explosion, batteries should not be disposed of by burning, but should be buried or dumped into a large body of water.

## PRECAUTIONS

Should the image intensifier tube be exposed to intense light, it will automatically cut off to prevent burning out the tube and to protect the eye. However, continuous exposure of an activator tube to intense light should be avoided.

During daylight operations, the lens cap must be positioned over the objective lens. The starlight scope should never be aimed directly at the sun since it will result in a complete failure of the tube.

**M14 RIFLE.** The weapon adapter bracket is aligned with the groove and screw recess on the left side of the receiver. The bracket is secured to the receiver by tightening the socket head screw with an allen wrench.

**M16 RIFLE.** The wing nut is unthreaded all the way to the thread stops. The tab is pulled away from the bracket and the mounting ear is pushed under the carrying handle of the rifle. The slotted groove is positioned in the base of the bracket over the top of the receiver group, inside the opening of the carrying handle. The wing nut is firmly tightened until the tab is pulled tightly against the carrying handle and bracket.

## MOUNTING THE SCOPE TO THE BRACKET

## INSTALLATION

The lock knobs of the boresight mount assembly are rotated forward until they come to bear on the pins located on the assembly. The mount assembly is moved onto the guide rail of the adapter bracket from the rear until positioned against the pin stop of the guide rail. The starlight scope is then locked to the weapon adapter bracket by rotating the two locking knobs of the bore sight mount assembly in a rearward direction.

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**ZEROING****MOVE THE RETICLE PATTERN IN THE  
DIRECTION OF THE IMPACT**

The starlight scope may be zeroed during the hours of daylight, dawn and dusk, or darkness. When making adjustments for errors in elevation or windage, the sight, or reticle, must be moved in the direction of the error, or impact.

The lens cap must be positioned over the objective lens during daylight. When zeroing in daylight, it may be necessary to cover one or two of the small pinholes in the lens cap to reduce the amount of light entering the starlight scope. Provisions should be made to permit the sniper to confirm his zero during the hours of darkness without the lens cap. This will ensure the zero is maintained when one or more holes in the lens cap are covered.

**ZEROING DURING DAYLIGHT**

Difficulty may also be experienced when attempting to zero the starlight scope just prior to daylight or just prior to darkness. The light level during this time is too low to permit the image intensifier tube to resolve the target with the lens cap in place; however, it is intense enough to cause the intensifier tube to automatically cut off when the lens cap is removed from the objective lens.

**ZEROING DURING DAWN OR DUSK**

For this zero, the sniper must:

**STABLE REST ZEROING**

- Know the rear sight setting of his weapon for a particular range.
- Mount the starlight scope and place the weapon into a stable rest.
- Sight through the sight of the weapon (not the starlight scope) and align the sight on the target.
- Without disturbing the lay of the weapon and scope, sight through the scope; adjust elevation and windage on the starlight scope until the "T" reticle is aligned on the same point of aim as the sights of the rifle.

When the reticle and rifle sights are aligned to the same point of aim, the starlight scope and weapon are zeroed for that range. The sniper should fire a few rounds to confirm the zero.



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**25-METER ZERO**

*Impact at 25 meters must be  
1 inch below and  $2\frac{1}{2}$  inches right of target  
for a 150-meter zero.*

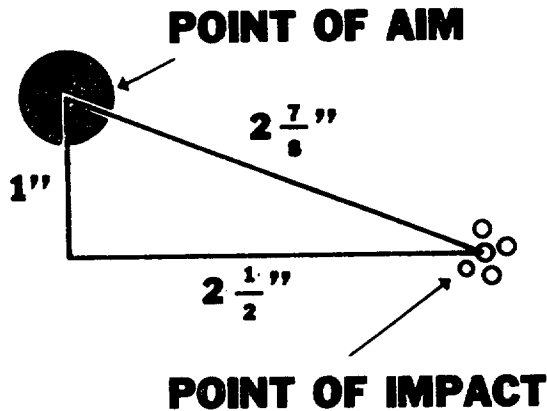


Figure 2-26. 25-Meter Zero.

This method requires the use of an observer to spot the strike of the bullet and give the correct sight changes to bring it to the point of aim.

The sniper and observer pick out a target that provides a definite point of aim and one that will show the strike of the bullet. This can be a brick building, dirt hillside, or any such surface.

Place the aiming reticle at the point of aim and fire one round. The observer estimates the distance between strike of the bullet and the aiming point and gives the change necessary to bring it to the point of aim. At 150 meters, the correction of an impact 2 feet high and 3 feet right of the aiming point would be up 8 clicks (24 inches) and right 12 clicks (36 inches). These adjustments are made and a confirming round is fired.

**EMPLOYMENT OF  
STARLIGHT SCOPE**

From a distance of 25 meters or 1,000 inches from the target, center the sight reticle on the target and fire a 3-round group.

From the center of the group, measure the distance to the proper point of impact.

Adjust the sight by moving the elevation and windage knobs until the impact is 1 inch below and  $2\frac{1}{2}$  inches right of the aiming point. "1 click" will move the strike of the bullet  $\frac{1}{2}$  inch at 25 meters.

The adjustment of the reticle is moved toward the impact of the bullet.

Sight settings obtained at 25 meters should be confirmed by firing at the actual range of 150 meters.

**FIELD EXPEDIENT ZERO**

The function of the starlight scope is to provide an efficient viewing capability during the conduct of night combat operations.

Although the starlight scope does not give the width, depth, or clarity of daylight vision, the individual can see well enough at night to aim and fire his weapon and observe its effect.

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Figure 2-27. Sniper Team.

The starlight scope may also be used to:

- Assist teams in deployment under the cover of darkness to preselected positions.
- Assist in movement to alternate positions undetected.
- Locate and suppress hostile fire.
- Limit or deny enemy movement at night.
- Counter enemy sniper fire.
- Demoralize the enemy with one-shot kills at night.

#### FACTORS AFFECTING EMPLOYMENT

The effectiveness of the starlight scope will depend on:

LIGHT LEVEL  
WEATHER CONDITIONS  
DENSITY OF TERRAIN  
EYE FATIGUE

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**LIGHT.** The starlight scope functions using ambient light of the night sky. Effective operation may be expected with

**USE OF FLARES AND ILLUMINATION TO THE FLANKS  
BRIGHT MOONLIGHT AND STARLIGHT  
SEARCHLIGHTS**

Clarity of vision is better with a starlight scope than with the naked eye under illumination. As the ambient light decreases, the viewing capabilities decrease, such as on a dark, overcast night.

**WEATHER CONDITIONS.** Clear nights provide the most favorable operating conditions, though limited viewing capabilities may be possible in sleet, snow, smoke, or fog conditions.

**EVALUATION OF TERRAIN**

- When viewing from open terrain into densely wooded terrain, penetration of the wood line is limited to a few yards. Also, targets against a very dark background are difficult to detect.
- When viewing into sparsely wooded terrain under moon or starlight conditions, penetration is greatly improved depending on the depth of the woods, location of the moon, and range.
- When viewing from wooded terrain into open terrain under moonlight, viewing capabilities are excellent. Care must be taken not to limit the field of view with trees.
- When moving through densely wooded terrain under all conditions, viewing capabilities may be limited to a few meters.
- When moving through sparsely wooded terrain under moonlight, viewing capabilities are good, though depth perception may be difficult with the magnification of objects by the starlight scope.
- Little difficulty should be experienced in following trails or roads under moonlight conditions.
- Viewing across rivers, streams, or lakes under moonlight provide excellent viewing with the reflection of light off the water.

**EYE FATIGUE.** The starlight scope will cause eye fatigue in most operators after 5 or 10 minutes of continuous observation. With practice, an observer will be able to look through the starlight scope for longer periods of time. To lessen eye fatigue, alternating eyes during the viewing will help.

**REMINDERS**

The starlight scope can still be used for a short time after the power switch has been turned off. This will help conserve battery life.

If the rubber eyeshield is not positioned around the eye and against the face, light can leak around the eyeshield and illuminate the sniper's face.

**MAINTENANCE**

The sniper must perform the following preventive maintenance services daily to ensure the proper functioning of the starlight scope:

- Inspect and service main housing of starlight scope for dents, cracks, or loose or missing parts. Tighten loose parts. Report missing parts or damaged main housing to organizational maintenance.
- Inspect and service objective and focal lenses for dirt, dust, cracks, scratches, and signs of fogginess or moisture. If lenses are scratched, cracked, or fogginess or moisture appears within either lens assembly, report condition to organizational maintenance.
- Inspect range focus ring for dirt, free operation, or damage. Clean the focus ring; report faulty operation of focus ring or range ring to organizational maintenance.
- Inspect the azimuth and elevation adjustment knobs for dirt, damage, and freedom of operation. Clean dirty knobs. Report faulty operation to organizational maintenance.
- Remove battery cap from battery housing and inspect for dirt, cracks, dents, and damaged battery spring, or O-ring. Inspect battery for corrosion, leaks, and other damage. Install new battery, if necessary, and reassemble battery cap.
- Inspect exterior of oscillator cap for dirt, cracks, and dents. DO NOT remove oscillator cap from oscillator housing. Clean outside surfaces only. Report damaged oscillator cap to organizational maintenance.
- Although the operator is not authorized to remove the oscillator cap, it is possible to check the functioning of the oscillator. Move the control switch to the "on" position and listen for the operating hum which is audible if oscillator is working. If operating hum cannot be heard, report condition to organizational maintenance.
- With control switch in the "on" position, look into the eyepiece and inspect for operation of the image intensifier tube. DO NOT attempt removal of the image tube from the main housing. Return control switch to the "off" position. Report all failures or malfunctions of image tube to organizational maintenance.
- Inspect boresight mount assembly for cracks, breaks, dents, dirt, and operability of locking knobs. Service and replace as required.
- Inspect rubber eyeshield for dirt, oil, cracks, flexibility, and other damage. Clean with a clean wet cloth. Replace damaged eyeshield and assemble new eyeshield onto eyepiece assembly.
- Ensuring the control switch is in the "off" position, remove the lens cap and inspect for dirt, obstructed holes, cracks, or other damages. Clean with wet cloth and reassemble to objective lens assembly. Replace damaged lens cap and reassemble.

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## 206. CARE AND CLEANING OF RIFLE AND EQUIPMENT

The sniper candidate, already an expert marksman, will be well aware of the benefits of keeping his equipment in a state of perfect repair and cleanliness. Nevertheless, his sniper training program must include a review of basic maintenance procedures and must stress the maintenance requirements for the special conditions he will encounter aboard ship, in weather extremes, and in combat. Additionally, he must be taught the methods for cleaning and safeguarding his sniper optical equipment.

### RIFLE MAINTENANCE

Rifle maintenance is any measure taken to keep the weapon in top operating condition. It includes inspection, repair, cleaning, and lubrication.

Inspection reveals the need for repair, cleaning, or lubrication. A weapon, sheltered in garrison and infrequently used, must be inspected often to detect dirt, moisture, and signs of corrosion, and it must be cleaned accordingly. A weapon in use and subject to the elements, however, requires no inspection for cleanliness, since the fact of its use and exposure is sufficient evidence that it requires repeated cleaning and lubrication. The sniper couples his daily cleaning chores, however, with a program of minute inspection for damage or defect.

### INSPECTION

The sniper, himself, can accomplish only the most superficial repair tasks, such as screw tightening or replacement. He has no disassembly authority (except that he may strip the bolt to clean and lubricate it), nor does he have a required variety of tools or parts. Field repair of the rifle is the responsibility of the rifle team equipment (RTE) repairman.

### REPAIR

### CLEANING THE RIFLE

#### TOOLS AND MATERIAL

- Cleaning patches.
- Dry cloths.
- Bore cleaner fluid. Fluid is used for cleaning both bore and chamber; it also temporarily inhibits rust.
- Hot soapy water or plain hot water. Water is a poor substitute for bore cleaner fluid but should be used when bore cleaner is not available.
- Cleaning rod. A cleaning rod is used in cleaning the bore and chamber. Soft metal rods of brass or aluminum are superior to hard steel rods, which may cause excessive wear on the lands, especially at the muzzle.
- Bore brushes (.30 and .45 calibers)
- Soft bristle paintbrush.
- Stiff or brass bristle scrub brush.

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**BEFORE FIRING.** The rifle must always be cleaned prior to firing. Firing a weapon with a dirty bore or chamber will multiply and speed up any corrosive action which may have begun. Oil in the bore and chamber of even a clean rifle will cause pressures to vary and first-round accuracy will be lost. In combat, the sniper will clean and dry the bore and chamber prior to departure on a mission and will be extremely careful to keep his rifle clean and dry en route to his objective area. Firing a rifle with oil or moisture in the bore will cause a puff of smoke that can disclose the sniper's position.

#### WHEN TO CLEAN THE RIFLE

**AFTER FIRING.** The rifle must be cleaned after it has been fired, because firing produces deposits of primer fouling, powder ashes, carbon, and metal fouling. Although modern ammunition has a noncorrosive primer which makes cleaning easier, the primer still leaves a rust if not removed. The rifle must be cleaned within a reasonable interval—a matter of hours—after cessation of firing. Common sense should preclude the question as to the need for cleaning between rounds. Repeated firing will not injure the weapon IF IT WAS PROPERLY CLEANED BEFORE THE FIRST ROUND. After a rifle has been fired, it must be cleaned daily for at least 3 consecutive days. For several days after that, it must continue to be checked for fouling by running a clean patch through the bore.

#### CLEANING PROCEDURES

- Assemble the brass cleaning rod with a bore brush on the end.
- Lay the rifle on a cleaning table or other flat surface with the muzzle away from the body and the sling down. Make sure you do not strike the muzzle or telescopic sight on the table.
- Always clean the bore from the chamber toward the muzzle:
  - With the bore brush, push the brush all the way through until it protrudes from the muzzle, then pull it back SLOWLY until it clears the chamber.
  - Run the bore brush through a MINIMUM of 20 times.
  - While cleaning, keep the muzzle lower than the chamber to prevent bore cleaner from running into the receiver or firing mechanism. Be careful not to get any type of fluid between the receiver and the stock. If fluid does get between the stock and receiver, the receiver will actually "slide" on the glass bedding every time the rifle recoils, thereby decreasing accuracy and increasing wear and tear on the receiver and glass bedding.
- Using a section of the cleaning rod and a .45 caliber bore brush, clean the chamber by rotating the brush 8 to 10 times. DO NOT scrub the brush in and out of the chamber.

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- Reassemble the cleaning rod with a swab holder attached. Insert a clean patch and run the patch through the bore. Change patches and continue the process until a patch comes out clean.
- Using the same procedure for cleaning the chamber, wrap a patch around the .45 caliber bore brush and rotate four or five times (in the chamber). Change patches and continue the process until a patch comes out clean.
- Finally, with a clean patch, apply a very light coat of cleaning solvent to the bore and chamber.

**BOLT.** Scrub the face of the bolt with the stiff bristle brush. Remove the grease, oil, and dirt from the bolt with a clean, dry cloth. In lubricating the bolt, put a light coat of rifle grease (if available) on the face and slides of the bolt.

**STOCK.** Since the M40A1 sniper rifle has a fiberglass stock, the only cleaning that is required is to use a clean rag with soap and water. Then, dry thoroughly to prevent moisture from accumulating beneath the receiver.

**BARREL (Outside).** Since the barrel is stainless steel, outer lubrication is not absolutely necessary.

**OTHER PARTS.** All metal parts are "blued" in manufacturing but still require lubrication, especially if scratched or if the bluing has rubbed off. Use a toothbrush to remove excessive grease, oil, and dirt. Use the soft-haired paintbrush to dust out recesses and to remove lint. Lubricate accordingly.

**LUBRICATING THE RIFLE.** All moving parts of the rifle should be lubricated with rifle grease or something similar.

### **NEVER REMOVE THE TORQUE SCREWS**

**THIS IS DONE BY A QUALIFIED RIFLE TEAM EQUIPMENT REPAIRMAN (MOS 2112). IF ANYTHING MALFUNCTIONS ON THE RIFLE, NEVER TRY TO REPAIR IT YOURSELF. ALWAYS TRY TO LOCATE A RIFLE TEAM EQUIPMENT REPAIRMAN.**

### **OPTICAL EQUIPMENT MAINTENANCE**

Dirt, rough handling, or abuse of optical equipment will result in inaccuracy and malfunction. When not in use, the rifle and scope should be cased, and the lenses should be capped.

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Lenses are coated with a special light-gathering material (HELIR). The coat is a very thin and great care is required to prevent damage to it.

#### CLEANING THE LENSES

- To remove dust, lint, or other foreign matter from the lens, brush it lightly with a clean camel hair brush.
- To remove oil or grease from the optical surfaces, breath heavily on the glass and clean it with lens tissue. In field use, where tissue may not be available, a soft clean cloth may be substituted.

Telescopes are delicate instruments and must be handled with care. The following precautions will prevent damage:

#### HANDLING TELESCOPES

- Check and tighten all mounting screws periodically and always prior to leaving on an operation. Be careful not to change coarse windage adjustment.
- Keep lenses free from oil and grease and never touch them with the fingers. Body grease and perspiration injure them. Keep lenses capped.
- Do not force elevation and windage screws or knobs.
- Do not allow the telescope to remain in direct sunlight, and avoid letting the sunrays shine through the lens. Lenses magnify and concentrate sunlight into a pinpoint of intense heat which is focused on the mil scale reticle. This may melt the mil dots and damage the telescope internally. Keep the lenses covered and the entire telescope covered when not firing or observing.
- Avoid dropping the scope or striking it with another object. This could damage the scope severely and permanently, plus change the zero.

TO AVOID DAMAGE TO THE SCOPE OR ANY OTHER SNIPER EQUIPMENT, THE SNIPERS OR RIFLE TEAM EQUIPMENT ARMORERS SHOULD BE THE ONLY PERSONNEL HANDLING THE EQUIPMENT. ANYONE WHO DOES NOT KNOW HOW TO USE THIS EQUIPMENT PROPERLY COULD CAUSE DAMAGE.



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## **MAINTENANCE AND CARE IN COLD CLIMATE**

### **RIFLE**

In temperatures below freezing, the rifle must be kept free of moisture and heavy oil, both of which will freeze, causing working parts to freeze or operate sluggishly. The rifle should be stored in a room with the temperature equal to the outside temperature. If the rifle is taken into a warm area, condensation will occur, thus requiring a thorough cleaning and drying before being taken into the cold. Otherwise, the condensation will cause icing on exposed metal parts and optics.

### **OPTICAL EQUIPMENT**

In extreme cold, care must be taken to avoid condensation and the congealing of oil on the glass.

- If not excessive, condensation can be removed by placing the instrument in a warm place. Concentrated heat must not be applied, because it will cause expansion and damage. Moisture may also be blotted from the optics with soft, dry cloths.
- In cold temperatures, oil will thicken and cause sluggish operation or failure. Focusing parts are particularly sensitive to freezing oils. Breathing will form frost, so the optical surfaces must be cleaned with lens tissue, preferably dampened lightly with alcohol. Do not, however, apply the alcohol directly to the glass.

## **MAINTENANCE AND CARE AFTER SALT WATER EXPOSURE**

### **RIFLE**

Salt water and salt water atmosphere have extreme and very rapid corrosive effects on metal. During periods of this exposure, the rifle must be checked frequently and cleaned as often as possible, even if it means only lubricating the weapon. The weapon should always be well lubricated, including the bore, except when actually firing. Before firing, always run a dry patch through the bore, if possible.

## **MAINTENANCE AND CARE DURING JUNGLE OPERATIONS (High Humidity)**

### **RIFLE**

- Use more lubricant.
- Keep rifle in case when not in use.
- Protect from rain and moisture whenever possible.
- Keep ammunition clean and dry.
- Clean rifle, bore, and chamber daily.
- Keep scope caps on scope when not in use. If moisture or fungus develops inside scope, get replacement scope.
- Clean and dry the stock daily.
- Dry the carrying case and rifle in the sun whenever possible.

- Use less lubricant and preservative oil due to the fact that oil collects sand and dust.
- Keep rifle free of sand by use of a carrying sleeve or the case when not in use.
- Keep the sight protected from the direct rays of the sun.
- Keep ammunition clean and protected from the direct rays of the sun.
- Use a toothbrush to remove sand from the bolt and receiver.
- Clean the bore and chamber daily.
- Protect the muzzle and receiver from blowing sand by covering with a clean cloth.

To protect the free-floating barrel of the weapon, *take an 8- or 9-inch strip of cloth and tie a knot in each end. Then, before going on a mission, slide the cloth between the barrel and stock all the way to the receiver and leave it there. When in your firing position, slide the cloth out, thus taking all restrictive debris and sand with it.*

Optics are especially vulnerable to hot, humid climates and salt water atmosphere.

**Sunrays.** Optical equipment must NOT be exposed to direct sunlight in a hot climate.

**Humidity and Salt Air.** In these environments, the optical instruments must be inspected and cleaned frequently to avoid rust and corrosion. A light film of oil is beneficial.

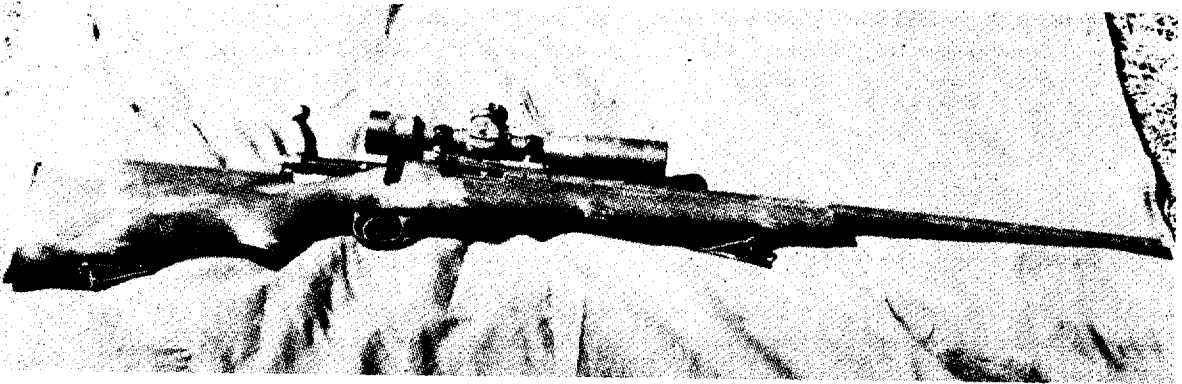
**Perspiration.** Perspiration from the hands is a contributing factor to rusting. After being handled, instruments must be thoroughly dried and lightly oiled.

## MAINTENANCE AND CARE, DESERT OPERATIONS

### RIFLE

## MAINTENANCE AND CARE, HOT CLIMATE AND SALT WATER ATMOSPHERE

### OPTICAL EQUIPMENT



### **SECTION 3**

## **MARKSMANSHIP TRAINING**

### **301. PURPOSE**

The purpose of sniper marksmanship training is to teach the sniper the principles and techniques of precision shooting with special sniper equipment.

### **302. FUNDAMENTALS**

Rifle marksmanship fundamentals are those basic factors that must be practiced constantly in order for a shooter to deliver accurate hits on a target, to effectively provide support for his rifle, to correctly align his sights on a target, and finally, to fire without disturbing his sight alignment.

### **303. PROGRESSIVE TRAINING**

Effective training in fundamentals can be provided by a six step program involving the following sequence of instruction:

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- Sighting and Aiming. The proper relationship between the eye, rifle sights, and target.
- Positions. Proper applications of all sniper positions.
- Trigger Control. Firing a rifle without disturbing the sights.
- Sight Adjustment. Proper manipulation of sights to regulate the strike of the bullet.
- Weather Effects. How weather conditions affect the sniper and the bullet and how to compensate for those conditions.
- Zeroing. Adjusting sights to hit a given target at a given range. How to bore sight a new scope.

### 304. SIGHTING AND AIMING

*General.* The arrangement of an optical sight allows aiming without the use of a front and rear sight. The role of a front sight in a telescope is filled by the crosshairs. The image (target) and crosshairs are on the same line of sight.

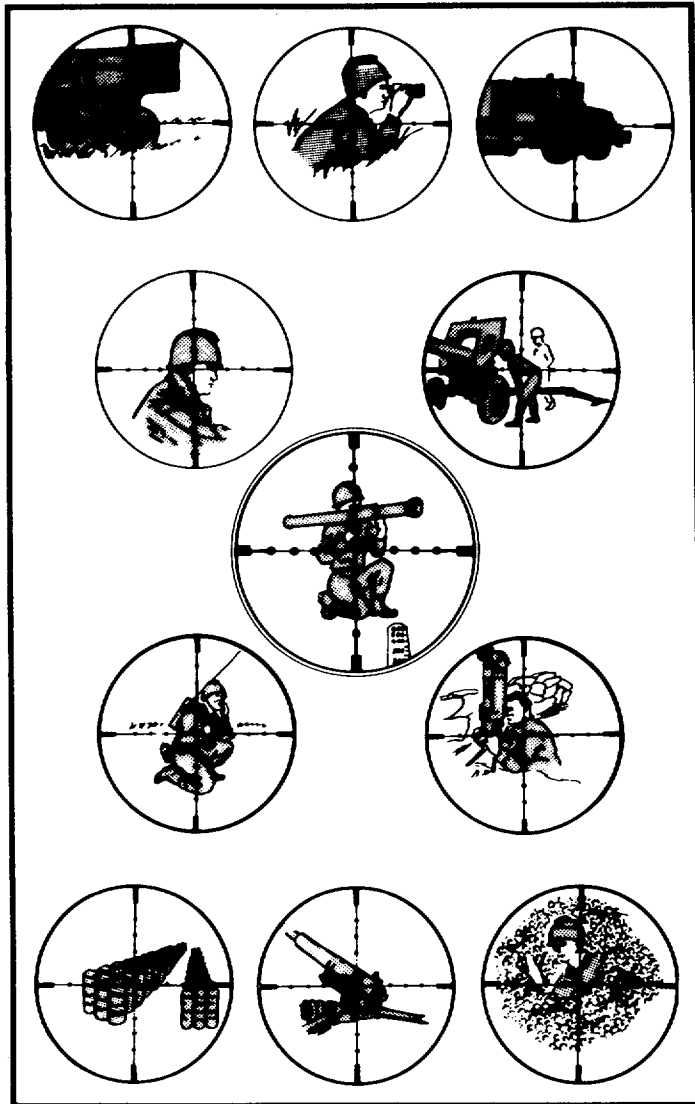


Figure 3-1. Sight Pictures.

The sniper sees the crosshairs and the image (target) at the same time. Both crosshairs and target have the same degree of clarity. The sniper's head must be placed at the exit pupil of the telescope. He then positions his head so that he has a full field of view with no shadows, places the crosshairs on the target, and *QUARTERS* the target.

**Exit Pupil.** The small circle of light seen coming from the eyepiece lens when a scope is held at arms length.



Figure 3-2. Quartering the Target.



Figure 3-3. Eye Relief.

### EYE RELIEF

In aiming, the eye must be located straight to the rear of the scope. A 2- to 3-inch distance is average. The sniper adjusts his eye relief to ensure a full field of view. It may be a fairly large distance, but it is necessary to ensure safety from recoil.

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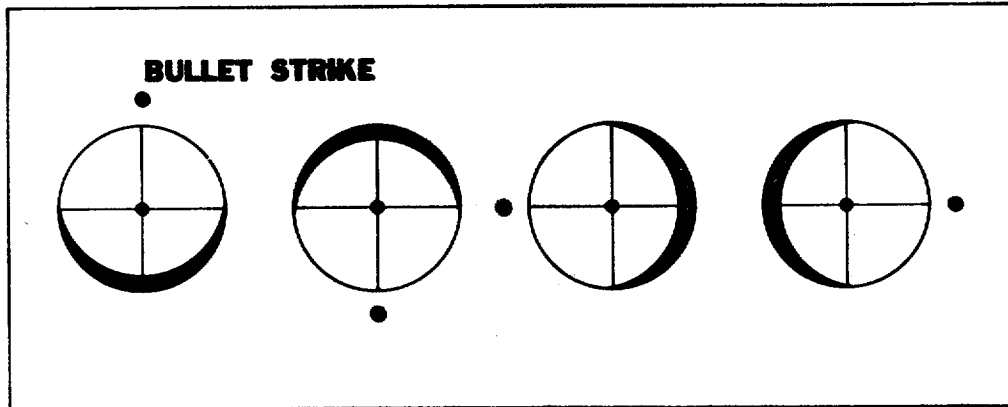


Figure 3-4. Shadow Effects.

### SHADOW EFFECTS

During aiming, the sniper must ensure that there are no shadows in the field of view of the telescope. The field of view must be completely clear. If the sniper's eye is located without proper eye relief, a circular shadow will be seen in the field of view, reducing the field size and hindering observation. If crescent-shaped shadows are present, the bullets will strike to the side away from the shadow.

If the sniper notices shadows on the edges of the field of view during aiming, he must find a position for his head in which his eye will see clearly the entire field of view of the telescope.

### HEAD ADJUSTMENT

### ADVANTAGES OF TELESCOPIC SIGHTS

The telescopic sights permit:

- Extreme accuracy in aiming, which enables the sniper to fire at distant, barely perceptible, and camouflaged targets which are not visible to the naked eye.
- Rapid aiming because the snipers' eye sees the crosshairs and the target with equal clarity, at the same time.
- Accuracy of fire under conditions of unfavorable illumination, such as at dawn and dusk and during periods of limited visibility (moonlight, fog, etc.).

### CANTING

Canting is the act of tipping the rifle to either side of the vertical. If the horizontal crosshair is canted, the strike of the bullet will hit in the direction of the cant. The more the cant, the further off the target the strike of the bullet will be.

### 305. TRIGGER CONTROL

Trigger control is the skillful manipulation of the trigger by which the sniper causes the rifle to fire without disturbing the alignment of the rifle with the target.

#### GENERAL

The trigger finger should contact the trigger at some point between the tip and the second joint. The exact placement is a matter of individual preference and depends on the size of the sniper's hand and the manner in which he grips the stock.

#### FINGER PLACEMENT

During the firing process, a gradual increase of pressure is applied straight to the rear on the trigger insuring the crosshairs continue to quarter the target. The crosshairs cannot be held indefinitely on the point of aim; therefore, the sniper must practice to *stop* the finger pressure on the trigger when the crosshairs move off the point of aim. The sniper applies the remaining pressure when the crosshairs come to rest on the point of aim.

The upper part of the trigger finger should be kept clear of the stock to allow a front-to-rear movement in applying pressure on the trigger. When the finger touches the stock, there is a tendency to cause pressure at a slight angle rather than straight to the rear, this will cause the sights to be pulled off the aiming point. A *firm* grip on the rifle stock is essential for good trigger control. A loose grip tends to cause the hand and trigger finger to squeeze the stock and thus lose trigger control.

Trigger control is the most important steady hold factor. However, it is the most *difficult* fundamental to master. The majority of errors stem directly or indirectly from the improper application of this technique. Missing the point of aim frequently results from the shooter jerking the trigger or applying pressure on both the trigger and the side of the rifle. Improper trigger control can start a chain reaction of other errors.

**Flinch.** An involuntary muscular tension in anticipation of recoil. It is indicated by:

#### BAD HABITS

- Moving the head.
- Closing the eyes.
- Tensing the nonshooting arm.
- Moving the shoulders.
- Combination of these.

**Buck.** Moving shoulders forward as the rifle recoils.

**Jerk.** An attempt to make the rifle fire at an exact time by sudden pressure on the trigger thus disturbing the alignment of the rifle with the target.

Followthrough is the continued mental and physical application of the fundamentals after each round has been fired. The sniper does not shift his position, move his head, or let the muzzle of the rifle drop until a few seconds after the rifle has been fired.

#### FOLLOWTHROUGH

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**CALLING THE SHOT**

The sniper calls his shot after the rifle is fired. Seeing the last sight picture as the rifle is fired, the sniper must make a determination as to where his sights were when the round broke. If he believes his shot to be at the aiming point and the shot is misplaced, the sniper could have violated one of the marksmanship principles. If the sniper is sure none of these fundamentals were violated, then a zero change is necessary. Calling the shot assists the sniper in constantly confirming his zero.

**306. SHOOTING POSITIONS****GENERAL**

A correct shooting position is essential to sniping. The more solid the position, the easier it is to hold the rifle and control the trigger without disturbing the sight picture.

**RIFLE SLINGS**

Leather slings are most used by snipers. The sling is constructed in two different lengths with two leather sling keepers to secure the sling once it is on the arm.

The leather sling is preferred over the web sling because of its strength and durability. It is easier to use once the sniper is taught the basic way to attach it to the rifle and how it is placed on the arm.

Another advantage of the leather sling is, once adjusted for a position, the adjustment need not be changed to tighten the sling on the rifle for carrying.

**ELEMENTS  
OF A GOOD  
SHOOTING POSITION**

The three elements of a good shooting position are:

**BONE SUPPORT****MUSCULAR RELAXATION****NATURAL POINT OF AIM**

*Bone Support.* A strong foundation is just as necessary to a rifle as to a well-built house. Good shooting positions employ bone support and not muscle support.

*Muscular Relaxation.* The sniper learns to relax in various shooting positions. Undue strain or tension causes trembling and is transmitted to the rifle. Through practice and natural point of aim, the sniper will be able to achieve muscular relaxation.

*Natural Point of Aim.* In a shooting position, once the target is spotted, the sniper closes his eyes, takes a deep breath, exhales, and concentrates on making his body completely relaxed. The rifle will fall to its natural point of aim. He opens his eyes and adjusts the position by slightly shifting his body until the rifle points to the target exactly where the bullet is to strike.



The five basic shooting positions used in sniper training are prone, sitting, kneeling, standing, and the Hawkins position. These positions are flexible to allow modifications according to the individual body structure. On the battlefield, a sniper must assume the steadiest position possible which will allow observation of the target area and provide cover and concealment. Depending on the terrain, vegetation, and tactical situation, there are innumerable possibilities; however, in most instances they will be variations of the five basic positions. Some snipers will have more difficulty in assuming a particular position than others. The sniper must apply the fundamentals of relaxation and maximum support for his rifle. He should be permitted to adjust the position to best fit his own body structure.

#### FORWARD HAND AND ELBOW

The palm of the forward hand is against the upper sling swivel. The wrist is straight and locked so that the rifle rests across the heel of the hand. The hand itself is relaxed. The fingers can be curled against but should not grip the stock, since the rifle should rest on the forward hand. The forward elbow should be directly under the receiver of the rifle, or as close to this position as the body will permit, with the forward elbow directly under the rifle. The bones (rather than the muscles) support the rifle's weight. The sniper, by trial and error, must find the forward hand and elbow position best suited to him to avoid tension and trembling.

#### FACTORS COMMON IN ALL POSITIONS

#### RIFLE BUTT IN THE POCKET OF THE SHOULDER

The sniper places the rifle butt firmly into the pocket of the shoulder. The proper placement of the butt helps steady the rifle and prevents it from slipping out of the shoulder. With the rifle butt firmly in the shoulder, the recoil is lessened.

#### GRIP OF THE SHOOTING HAND ON THE RIFLE

The shooting hand grips the small of the stock firmly but not rigidly. A firm rearward pressure is exerted by the gripping hand to keep the rifle butt in its proper position in the pocket of the shoulder to reduce effects of recoil. The thumb lays on the small of the stock in its natural position, and also forms a rest for the chin. In this way it creates a spot weld. The trigger finger is placed on the trigger in a natural position to enable the shooter to manipulate his trigger independently of the rest of his hand. This permits the trigger to be squeezed directly to the rear without disturbing the point of aim.

#### REAR ELBOW

The placement of the rear elbow gives balance to the sniper's position. Correctly positioned, the elbow helps form the shoulder pocket. The exact location of the elbow varies with each position and will be described in the explanation of each position.

#### SPOT WELD

The spot weld is the point of firm contact between the sniper's cheek and thumb on the small of the stock. The firm contact between the head, hand, and rifle enables the head and weapon to recoil as one unit, facilitating rapid recovery between rounds. The spot weld also enables the eye to be positioned the same distance behind the eyepiece (eye relief) of the scope each time the rifle is aimed and fired. This guarantees the same field of view with each sight picture, further assisting in accurate aiming. If the sniper is unable to obtain a spot weld, he should use the stock weld.

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Figure 3-5. Spot Weld.



Figure 3-6. Stock Weld.

### BREATHING

Normal breathing will cause the rifle to move while aiming and firing. To avoid this movement, the sniper holds his breath for a few seconds and, during this time, he should fire his round. He takes a normal breath, releases part of it, and holds the remainder. He should not hold his breath for over 10 seconds, because his vision may blur and lung strain may cause muscular tension.

### SUPPORTED POSITIONS

These positions should be used extensively by snipers. The support or rest almost guarantees no movement of the rifle. The rest prevents muscular tension and pulse beat which is transmitted to the rifle, and throws the shot off target. The longer the range the steadier the rifle must be. Use of the supported positions allows a much lower silhouette and therefore offers more cover and concealment. There are four types of positions using the supported rest—prone, sitting, kneeling, and the Hawkins. These positions may be modified to fit the sniper's location, depending on the terrain, vegetation, and situation on the battlefield. When using a supported rest, the rest itself can be any material available, such as sandbags, logs, fencing, and even the partner's back.

### PRONE

The prone position is the most common position used. The sniper rests his rifle on a solid object somewhere near the front sling swivel, making sure the rifle barrel is *NOT* resting on the support. If the barrel touches the support in any way, the accuracy of the weapon is greatly decreased. The nonshooting arm grasps the sling on the rear sling swivel, in this way the sniper can adjust the weapon on the target. With a firm hold on the rifle, the sniper places the stock into the pocket of the shoulder and applies rearward pressure into the pocket. The shooting hand is placed in the normal manner on the small of the stock; the sniper then makes his mental checklist.



Figure 3-7. Prone Position (Supported).

- Is the body directly behind the rifle to better absorb recoil?
- Is the nonshooting hand grasping the sling and rear swivel with a firm pressure towards the pocket of the shoulder?
- Does the sniper have proper eye relief? Does the sniper have full field of view in scope?
- Is the grip on small of stock firm? Is trigger finger applying pressure straight to the rear?
- Is the sniper breathing so that crosshairs are moving from 12 o'clock to 6 o'clock (straight up and down)?
- Are the crosshairs quartering the target?

This position is one in which the sniper can modify for use behind any cover which provides a platform on which his rifle can be rested. The sniper must be careful not to rest the barrel of the rifle in any way on the support as this could affect accuracy.

## SITTING

Kneeling positions are used when the position has to be higher to shoot over an obstacle. The rifle is supported on a rest, making sure rest is not touching the barrel. The nonshooting hand may be placed on the leg to ensure a solid position.

## KNEELING

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Figure 3-8. Sitting Position (Supported).



Figure 3-9. Kneeling Position (Supported).



Figure 3-10. Hawkins Position.

The Hawkins position is used when a low silhouette is desired, such as when shooting on flat ground, off a roof, or down grade. The position is the same as the prone, except the support is provided by the nonshooting hand. The sniper assumes a prone position, slides his nonshooting hand up to the front sling swivel, and grasps the sling firmly. The wrist and elbow are *locked* straight. This takes up most of the recoil. The rear, or toe of the stock is placed under the armpit and rests on the ground if possible. It will appear that the sniper is lying on the rifle.

## HAWKINS



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Figure 3-11. Rifle being Carried.



Figure 3-12. Rifle in Position.

### 307. M16 QUICK KILL METHOD

The rifle is carried in a position that allows the partner to get a shot off in less time than if he was carrying the rifle at port arms.

When the rifle is raised to shoot, the eye is looking at the target. As the sniper looks at his target, the front sight comes into view, and at that same moment the shot is fired without actually looking for a sight picture.

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Figure 3-13. Observer Sniper Positioning.

### 308. OBSERVER, SHOOTER POSITIONING

When the sniper and observer are operating together in position, the observer should be close to the sniper's right side (if a right handed shooter) to be able to converse with him in a low voice. The team should be close to each other so both members can look on a single range card or map. The observer should also be in a position to watch the vapor trail of the bullet down range. This will help the observer spot the splash of the impact of the round to give the sniper a correction for his next shot, if it is needed.

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### 309. ZEROING

#### PRINCIPLES OF ZEROING

##### BULLET PATH AND POINT OF AIM

To understand the principles of zeroing, the sniper should have a basic knowledge of the relationship between the path of the bullet and line of aim. A bullet does not follow a straight line, but travels on an arc which is called the bullet's trajectory.

##### DEFINITION OF ZERO

The zero of a rifle is the sight setting in elevation and windage required to place a shot in the center of a target, at a given range, when no wind is blowing.

#### CONDUCT OF BORESIGHTING

Boresighting with Unertl sniper scope is conducted only in respect to coarse windage adjustment.

The sniper first must insure that:

- The *elevation* range knob is turned to 3.
- The elevation *fine* tune knob is at 0.
- The *windage* knob is at 0.

With the bolt removed from the rifle, the rifle is placed on a solid support such as a sandbag or an ammo can.

Looking through the barrel (at the chamber end), the sniper adjusts the rifle until the desired aiming point is visible through the center of the bore.

Without disturbing the lay of the rifle, he looks through the telescope and observes the position of the crosshairs in relation to the aiming point. If the crosshairs do not coincide with the aiming point, he loosens the rear mounting screws on the scope mount. He turns the screws to move the scope left or right, depending on the direction the crosshairs need to go.

*Example:* To move the crosshairs (vertical) onto the aiming point, he looks through the scope, turns the left screw against the scope mount to push the rear of the scope right. The crosshairs will be moving to the left.



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Figure 3-14. Course Adjustment with Scope Base for Zeroing.

*Zero scope as follows:* Set range knob to "3" (300 yards). Set windage and elevation vernier to "0". Fire a group at 300 yards. If the point of aim/point of impact difference is greater than 12 feet (assuming center allen screws are set as received from factory; i.e., elevation screw .035 inches below knob surface and windage screw .035 inches below surface), the scope mounting should be adjusted. Approximately .001 inch change in one end of mount will change point of aim/point of impact distance by 1 foot. The mount base should be milled as required to bring the elevation to within 12 minutes. Windage should be adjusted to as close to "0" as possible using the rear mount windage adjusting screws (course adjustment).

Final zeroing may now be done using the allen screws in the center of the elevation and windage knobs. Loosen set screws and carefully adjust large allens until point of aim and point of impact are coincident. No more than + or -  $\frac{1}{4}$  turn should be required if mounting has been adjusted as described above. After scope is zeroed, *securely* tighten set screws. The rifle should now shoot point of aim/point of impact at all ranges from

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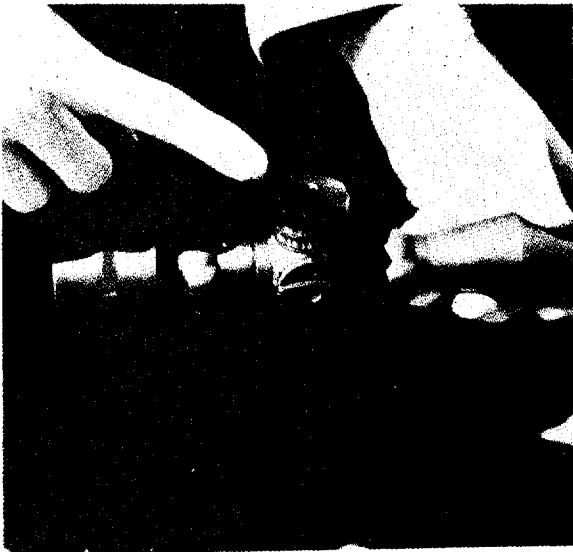


Figure 3-15. Zeroing with Allen Wrench Elevation Control (View 1).

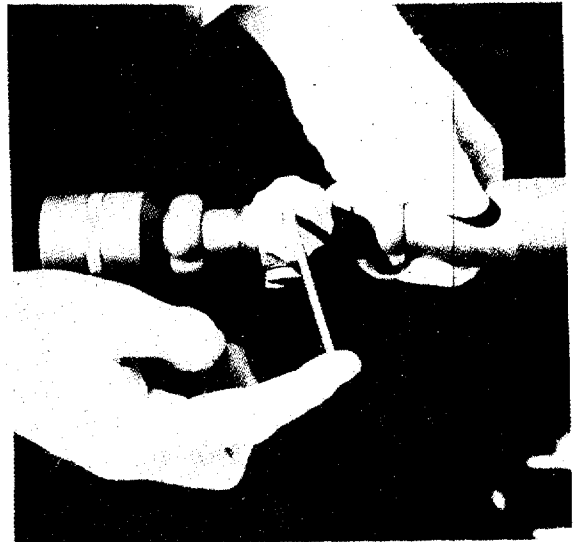


Figure 3-16. Zeroing with Allen Wrench Elevation Control (View 2).

100 to 1,000 yards when the range knob is set to the corresponding range. Windage may be adjusted + or -4 minutes (via fine tune knob) as needed. Elevation may be adjusted + or -3 minutes as needed to compensate for temperature and other variables, using the elevation fine tune knob.

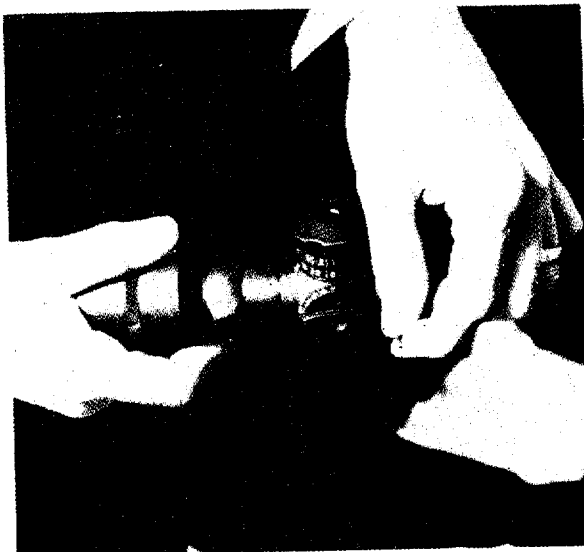


Figure 3-17. Zeroing with Allen Wrench Windage Control (View 1).

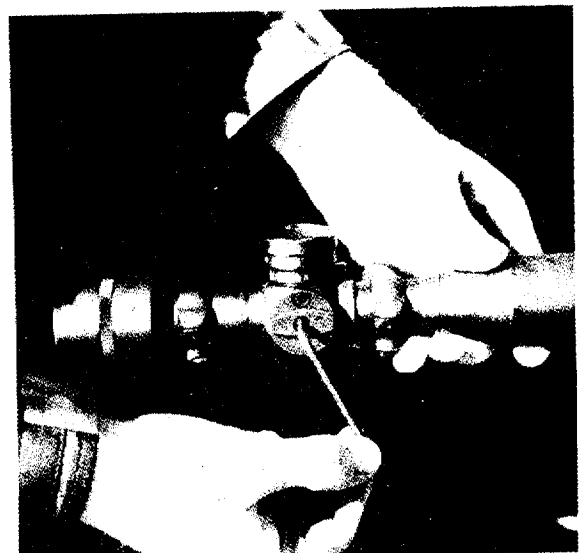


Figure 3-18. Zeroing with Allen Wrench Windage Control (View 2).

### 310. EFFECTS OF WEATHER

Wind, light, temperature, and humidity all have some effect on the bullet, the sniper, or both. Under average conditions, some weather effects, such as temperature and humidity, are insignificant. Sniping sometimes is done in extremes, so all effects must be considered.

Wind is usually the greatest weather problem. As wind velocity increases, the effect on the bullet increases, depending on the wind direction and/or as the range increases.

Winds are classified according to the direction from which they are blowing.

#### CLOCK SYSTEM

The clock system is used to determine what direction and what force or velocity the wind is blowing. This is known as the value of the wind. With use of a formula, a sniper can adjust his scope to compensate for the wind and to hit center.

A 9- to 3-wind has the most effect on a bullet. This is the full value wind.

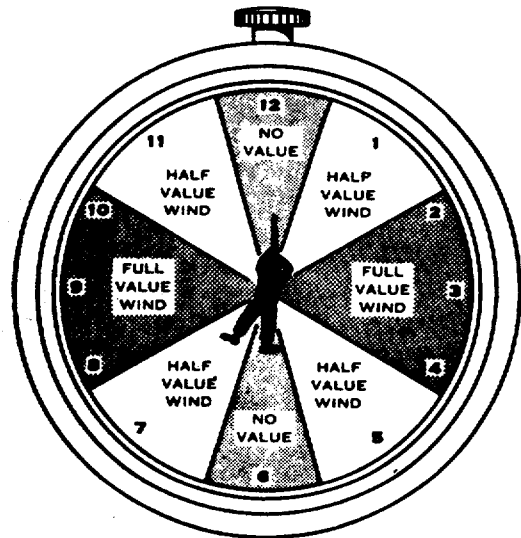


Figure 3-19. Clock System.

There are three common field expedient methods of approximating wind speed. Due to the snipers situation, all three should be learned.

#### WIND VELOCITY

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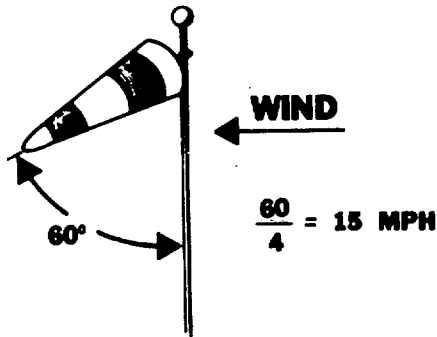


Figure 3-20. Flag Method.

**FLAG METHOD**

If a sniper can observe a flag or cloth like material hanging from a pole and estimate the degrees from the tip of the flag to the mast, he can estimate wind velocity. He divides the constant number 4 into the number of degrees to get wind velocity in miles per hour.

If the tactical situation prevents the use of the other methods, snipers can use the following guides:

- A wind under 3 miles per hour can hardly be felt, but causes smoke to drift.
- A 3- to 5-mile per hour wind is felt lightly on the face.
- A 5- to 8-mile per hour wind keeps tree leaves in constant motion.
- An 8- to 12-mile per hour wind raises dust and loose paper.
- A 12- to 15-mile per hour wind causes small trees to sway.

**OBSERVATION METHOD**

The M49 spotting scope can be used to "READ" THE WIND. THIS IS DONE BY OBSERVING THE "MIRAGE". The sun heats up the earth's surface causing heat waves in the same manner as a piece of metal does. These waves appear to ripple or shimmer and rise straight up from the ground on a calm day. Any movement of air, however slight, will send these waves in the direction of the air flow. This mirage is clearly seen on a bright clear day. To see this mirage through an M49 spotting scope, the sniper will first focus on an object somewhere close to his target. He then rotates the eye piece  $\frac{1}{4}$  turn *counterclockwise*. This causes the actual focus to be short of the target, but the mirage is seen clearly.

**SPOTTING SCOPE METHOD**

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By determining whether the waves appear to be slow or fast and from left or right, the sniper will be able to determine wind velocity and wind direction. Only after constant use can a sniper become proficient in determining how much windage adjustment to put on his rifle.

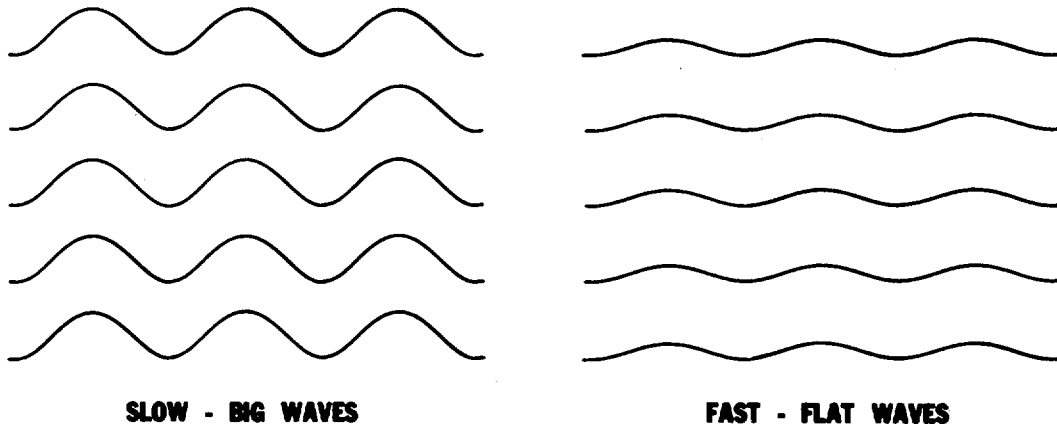


Figure 3-21. Mirage.

After finding wind direction and velocity, the windage correction is determined by the formula:

$R \times V$  divided by 15:

R=Range in hundreds of yards

V=Wind velocity in miles per hour

15 is a constant number.

For  $\frac{1}{2}$ -value winds divide the answer to the above formula by 2.

This formula is accurate up to 500 yards. Beyond 500 yards, it varies due to bullet velocity loss. However, by changing the constant "15" as follows, the correct windage may be determined:

### DETERMINE WINDAGE ADJUSTMENT

600 yards, divided by 14

700 yards, divided by 13

800 yards, divided by 13

900 yards, divided by 12

1,000 yards, divided by 11

Only by considering all the effects of weather, can a sniper recognize which is his most immediate problem. Proper recording on a daily basis while shooting is most important. If a change is indicated, it should be applied to all ranges.

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**311. HOLDS AND LEADS**

Holds and leads are advanced techniques of marksmanship that enable the sniper to hit his target without holding his crosshairs directly on the target.

**HOLDS**

Holding for elevation or wind are techniques used only when snipers do not have time to change sight settings. Pinpoint accuracy is rarely achieved when holding, since a minor error in range estimation, or lack of a precise aiming point, might cause the bullet to miss the desired point. However, a hit anywhere on the body is normally disabling, so a small error is acceptable in combat.

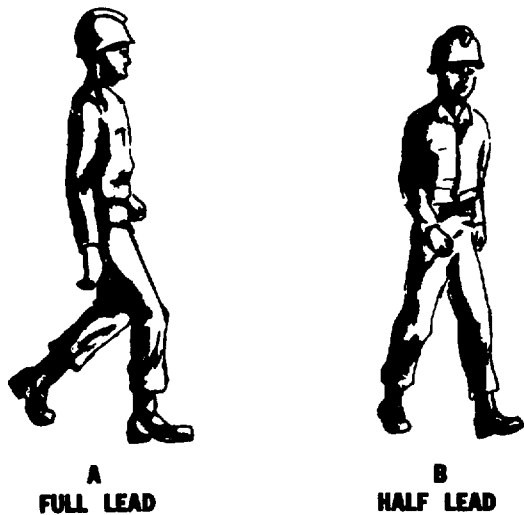
With the USMC scope, the only holdoff on a target would be a windage holdoff. When the sniper has determined what the wind is blowing and has adjusted his sights accordingly, he then may have to hold off right or left of the target slightly, depending on the "pick up" or "let off" of wind blowing. Constant practice in wind estimating can bring about proficiency in sight adjustment or learning to "holdoff" correctly.

**HOLDOFF****LEADS**

Moving targets are the most difficult to hit. When engaging a target which is moving straight (3 to 9 o'clock, 9 to 3 o'clock) across his line of sight, the sniper must concentrate moving his sight with the target, or with practice, using the "ambush" method. This is holding the crosshairs still and waiting for the target to move into the desired point, at which time, the sniper fires and lets the target walk into the bullet.

The angle of movement an enemy is walking is important, in that the holdoff for different angles change the amount of lead on the target.

**ANGLE OF TARGET MOVEMENT**



Figures 3-22 A and B show *FULL LEAD*. One arm and side are visible.

A *HALF LEAD* is when two-thirds of the front or back are visible. The half lead target is moving at an angle of approximately 45 degrees from the sniper.

Figure 3-22. Determining Angle of Movement.  
(Full Lead and Half Lead)

A no lead target occurs when the entire back or the front of the target is visible. The target is moving directly toward or away from the sniper. These are straight away shots.

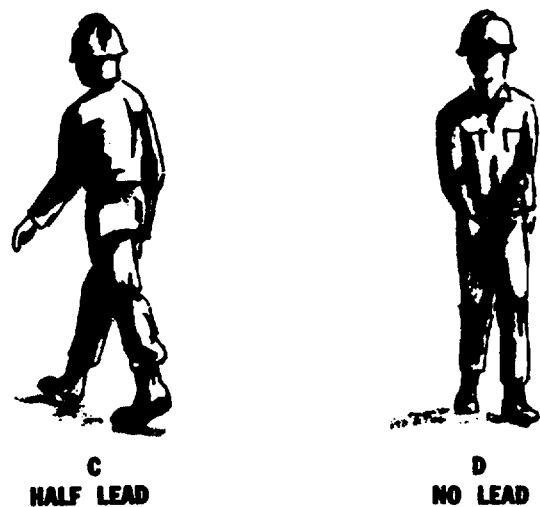


Figure 3-23. Determining Angle of Movement.  
(Half Lead and No Lead)

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## SECTION 4

### FIELD SKILLS

#### 401. TARGET DETECTION AND SELECTION

The sniper's mission requires him to:

##### GENERAL

- Support combat operations.
- Deliver precise fire at selected targets.
- Be concerned with the significance of a target.
- Index the location and identification of his target.
- Fire in the order of target priority.

Though it is possible to come across targets of opportunity while on the move, the sniper should not rely on these as primary targets. The proper method is to select a specific area for observation, move to that area under cover of darkness, and set up in a well-concealed position. This position should have:

##### SNIPING POSITION

- Good fields of observation.
- Prearranged escape route.
- Security to the rear.



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**SEARCHING**

The sniper team should be in position by first light. Initially, a HASTY SEARCH is conducted to detect enemy in the immediate area. Once this is done, a DETAILED SEARCH is conducted over the entire area.

This is where the art of observation comes into play. Every minute object is studied and identified for possible evidence of the enemy.

**INDEXING TARGETS**

The sniper team must have an accurate method of relaying the locations of possible targets to one another. The following is a conversation between a sniper and an observer:

OBSERVER:	"I see something over there."
SNIPER:	"Over where?"
OBSERVER:	"Way over there to the right."
SNIPER:	"Where to the right?"
OBSERVER:	"Beside that big tree."
SNIPER:	"Which tree?"

It is easy to see how ineffective this team would be. The indexing of targets prevents confusion and provides a quick reference guide. This is a conversation with the targets indexed:

OBSERVER:	"Target, Sector A, barn door, 800 meters."
-----------	--

**METHODS OF INDICATING  
TARGET POSITIONS**

PROMINENT OBJECTS and TERRAIN FEATURES are drawn on the sniper's range card with the individual distances. A target can be spotted quickly by its relation to one of the prominent features on the card. The following are methods of indicating the position of possible targets:

- Use of the mil scale on binoculars.
- Hasty methods such as the width of the hand, fist, or fingers held at arm's length; e.g., "Three fingers left of the dead tree."

**NUMBER OF TARGETS**

If the sniper is unable to remember all locations, he must concentrate on the most prominent.

*Exposure Time*

## CONSIDERATIONS

- Moving targets are only exposed for a short time.
- The sniper must be alert to note points of disappearance of as many targets as possible before engagement.
- He should take several of them under fire in succession.

*Evaluating Aiming Points*

- Targets which disappear behind good aiming points are easily remembered.
- Targets with poor aiming points are easily lost. When two targets of the same value, that are equally dangerous, present themselves, the sniper will engage the POOR aiming point first.

## TARGET DETECTION

Depending on the skill of the enemy the sniper is employed against, the difficulty in locating that enemy will range from difficult in detecting a carefully moving patrol to almost impossible detecting scouts or other snipers.

The following are indicators that lead to detection:

## INDICATORS

- **MOVEMENT.** The hasty search provides the best means for picking out movement.
- **IMPROPER CAMOUFLAGE.** A majority of the targets on the battlefield will be detected because of improper camouflage. However, many times an observation post or enemy firing position will blend almost perfectly with the natural background. Only through extremely careful, detailed searching will these positions be revealed.
- **SHINE.** Shine may come from many sources, such as eye-glasses, reflective metal, optical devices, pools of water, and even the natural oils from the skin. Shine may only last for a second, so the sniper has to be alert to observe it.

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## INDICATORS (Continued)

- **OUTLINE.** Most enemy soldiers will use camouflage on themselves, their equipment, and positions. The sniper must be able to identify objects, even if he can only see parts of them, and see them from unusual angles.
- **CONTRAST.** Unusual color stands out against its background (e.g., dead vegetation), as does a piece of improper camouflage, a small patch of fresh soil, and unburied communication wire. While observing, anything that looks out of place or unusual should be studied in minute detail by the sniper. Curiosity will greatly increase the chances of spotting the hidden enemy.
- **SOUND.** Sound can be used to detect an enemy position.
- **CRACK AND THUMP METHOD.** The first sound heard will be the crack of the bullet flying at supersonic speed as it passes overhead. More than one crack may be heard if the bullet passes several objects. This is always followed by a lower sounding thump. This is the discharge of the rifle. At short ranges, the sounds will be close together. As the range increases, the sounds are farther apart. With practice, one can determine the distance to the firer. A 1-second lapse between crack and thump is about 600 yards; a ½-second lapse is 300 yards. Once range has been determined, by watching in the direction of the sound, a trained observer can usually identify the enemy position.

A sniper selects targets according to their value. A target's real worth is determined by the sniper and the nature of his mission.

## TARGET SELECTION

- Officers
- Noncommissioned officers
- Scouts
- Crew-served weapons personnel
- Tank commanders
- Communication personnel
- Snipers

## KEY TARGETS

A sniper's target may be forced upon him. He may lose a rapidly moving target if he waits to identify it in detail. He must consider any enemy who threatens his position as a very high-value target. When able to make a choice, there are certain factors to consider:

## CONSIDERATIONS OF SELECTION

- **DISTANCE.** Not risking a shot without special reason. A normal shot is between 600 and 1,000 yards; 800 yards would be a good medium. Also, a sniper should never fire at less than 300 yards because of the danger of being spotted, unless his position is being threatened.
- **MULTIPLE TARGETS.** A sniper should carefully weigh the possible consequence of shooting at one of a number of targets, especially when he cannot identify the target in detail. He may trade his life for an inconsequential target by putting himself in a position of a defensive fire fight. **ONLY** when a sniper is positively sure his position will not be exposed or detected will he fire more than **THREE** shots from any one position. A well-placed shot can disable crew-served weapons, radios, vehicles, and other equipment. However, such equipment may be used as bait for more targets coming to assume control of the equipment.

#### INFORMATION COLLECTION

When in position close to the enemy, the sniper must be absolutely sure of his decision to fire. He must ask himself if he observed longer, would the information he gathered far exceed the value of a kill. The well-trained sniper will sensibly evaluate such situations.

## 402. RANGE ESTIMATION

Estimating range is determining the distance between two points. The ability to accurately determine range is a key skill which must be developed by the sniper. It can spell the difference between a one-shot kill and a miss.

#### GENERAL

There are a number of methods that can be used for estimating range:

#### RANGE ESTIMATION METHODS

- Measuring distance from a map.
- Pacing the distance (probably feasible only in a defensive position).
- Estimating by eye.
- Range cards.
- Use of mil scale reticle or mil scale in binoculars in conjunction with mil relation formula (range estimation formula method).

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## ESTIMATING BY EYE

- **100-Yard Increment Method**

To use this method, the sniper must be able to visualize a distance of 100 yards (football field) on the ground. For distances up to 500 yards, he determines the number of 100-yard increments between himself and the target. At ranges beyond 500 yards, the sniper selects a point midway to the target. He then determines the number of 100-yard increments to the halfway point, then **DOUBLES** the result. The 100-yard increment method depends on how much ground is visible to the sniper. If only a small portion of the ground is visible, the 100-yard method is not accurate.

- **Appearance-of-Objects Method**

The sniper must know the sizes and details of personnel and equipment at known ranges. He can compare these characteristics to similar objects at unknown distances and thus estimate objects at unknown distances. Snipers must be thoroughly familiar with characteristic details of objects as they appear at various ranges (such as appearance of men) in various positions (prone, kneeling, or standing). The sniper establishes a series of mental images which will help him determine ranges on unfamiliar terrain. Successful use of this method depends on visibility.

- **Combination of Methods**

Under proper conditions, the 100-yard unit of measure or the appearance-of-objects methods are effective ways of determining range. However, proper conditions rarely exist on the battlefield. Terrain with a lot of deadspace limits the accuracy of the 100-yard increment method, and visibility limits the accuracy of the appearance-of-objects method. The sniper will get a more accurate estimate of range if he utilizes a combination of several methods to support his answer. If both team members come up with a different estimate of range to a target, an average between the two answers is taken.

- **Bracketing Method**

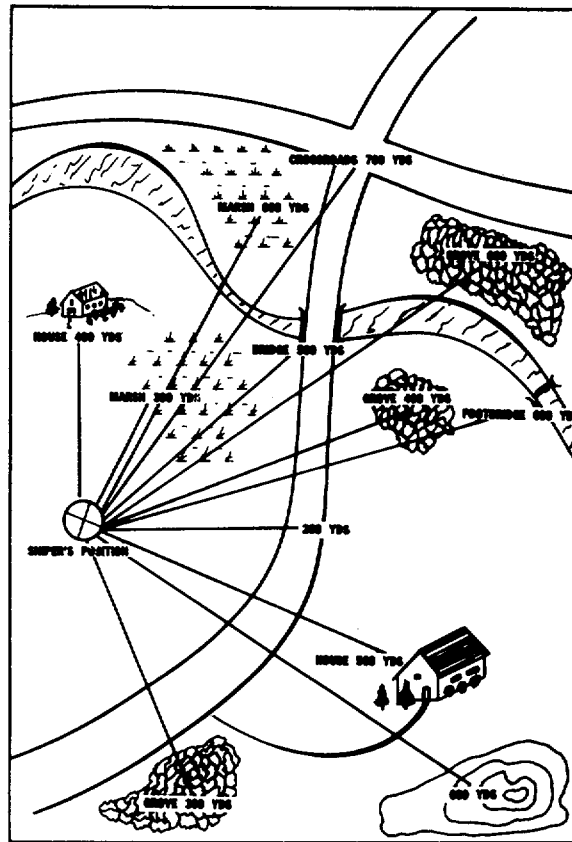
This method is used if the sniper assumes the target is no more than "X" meters away, but no less than "Y" meters. He then estimates a distance somewhere between "X" and "Y."

- **Range Card Method**

Information contained on the sniper's range cards establishes reference points from which the sniper can judge distance rapidly and accurately. When a target appears, its position and range are quickly determined.

- **Range Estimation Formula Method**

This method requires the use of either binoculars or telescopic sights, equipped with mil scales. To use the formula, the sniper must know the average height of a man or any given piece of equipment, and he must be able to express the height of the target in **YARDS** as follows:

**FMFM 1-3B**

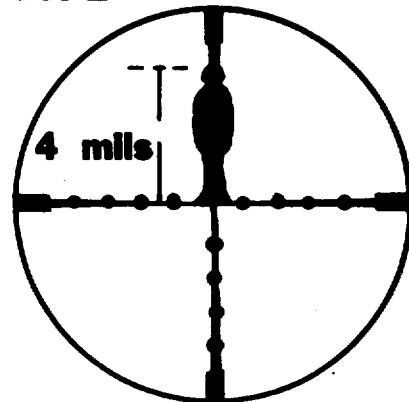
**Figure 4-1. Field Expedient Range Card.**

$$\frac{\text{Size of Objective (in yards)} \times 1,000}{\text{Size of Objective (in mils)}} = \text{Range}$$

**EXAMPLE:** A sniper, looking through his scope sees a man standing. He measures the size of the man, using the mil scale reticle in the scope or the binoculars, and determines that the man is 4 mils high. He has previously determined that the average enemy is 6 feet tall. To convert that figure to yards, he divides by 3 and finds the average enemy is 2.0 yards tall.

$$\frac{2.0 \times 1,000}{4} = \frac{2,000}{4} = 500 \text{ yards}$$

(See appendix A for the formula worked out for various average sizes of men and objects. When entering a conflict, the sniper should determine the average size of enemy soldiers as soon as possible.)



**Figure 4-2. Mil Scale Reticule in Use During Range Estimation.**

Once the formula is understood, the sniper need only estimate the actual height of any target (in mils) and he can determine the range to that target with extreme accuracy. If estimating range to a half-sized target (head to waist—36 inches or 3 feet), cut the formula in half:

$$\frac{1 \text{ yard} \times 1,000}{\text{Number mils head to waist}}$$

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LIMITATIONS

While this formula can be extremely accurate, it does have limitations:

- At long ranges, measurement in mils must be precise to the nearest quarter mil or a miss can result. **EXAMPLE:** A man standing appears to be 2 mils high; he is 1,000 yards away. If he is actually 1 3/4 mils high, he is 1,143 yards away. Careless measurement could result in a range estimation error of 143 yards, therefore resulting in a miss.
- As with any formula, care must be taken, or a totally wrong answer can result. The formula depends entirely on the sniper's ability to estimate actual heights of targets in mils.

FACTORS AFFECTING RANGE ESTIMATION

FACTORS TO BE CONSIDERED IN DETERMINING RANGE BY EYE	OBJECTS APPEAR NEARER THAN THEY REALLY ARE	OBJECTS APPEAR MORE DISTANT THAN THEY REALLY ARE
THE TARGET—ITS CLEARNESS OF OUTLINE AND DETAILS	WHEN MOST OF THE TARGET IS VISIBLE AND OFFERS A CLEAR OUTLINE.	WHEN ONLY A SMALL PART OF THE TARGET MAY BE SEEN OR IS SMALL IN RELATION TO ITS SURROUNDINGS.
NATURE OF THE TERRAIN OR POSITION OF THE OBSERVER	WHEN LOOKING ACROSS A DEPRESSION MOST OF WHICH IS HIDDEN FROM VIEW.	WHEN LOOKING ACROSS A DEPRESSION ALL OF WHICH IS VISIBLE.
	WHEN LOOKING DOWNWARD FROM HIGH GROUND.	WHEN LOOKING FROM LOW GROUND TOWARD HIGH GROUND.
	WHEN LOOKING DOWN A STRAIGHT, OPEN ROAD OR ALONG A RAILROAD TRACK.	WHEN FIELD OF VISION IS NARROWLY CONFINED AS IN TWISTED STREETS, DRAWS, OR FOREST TRAILS.
LIGHT AND ATMOSPHERE	WHEN LOOKING OVER UNIFORM SURFACES LIKE WATER, SNOW, DESERT, OR GRAIN FIELDS. IN BRIGHT LINE OR WHEN THE SUN IS SHINING FROM BEHIND THE OBSERVER.	IN POOR LIGHT SUCH AS DAWN AND DUSK, IN RAIN, SNOW, OR FOG, OR WHEN THE SUN IS IN THE OBSERVER'S EYES.
	WHEN THE TARGET IS IN SHARP CONTRAST WITH THE BACKGROUND OR IS SILHOUETTED BY REASON OF SIZE, SHAPE, OR COLOR.	WHEN THE TARGET BLENDS INTO THE BACKGROUND OR TERRAIN.
	WHEN SEEN IN THE CLEAN ATMOSPHERE OF HIGH ALTITUDES.	

Figure 4-3. Range Estimation Chart.

## 403. CAMOUFLAGE

Camouflage, to the sniper, is the personal concealment he uses in combat to remain undetected by the enemy. Along with knowing how to adapt his dress for the best concealment, the sniper must also know how to use the ground, proper firing positions, and routes during movement to remain hidden.

### TARGET INDICATORS

**A TARGET INDICATOR IS ANYTHING A SNIPER DOES OR FAILS TO DO THAT WILL REVEAL HIS POSITION TO AN ENEMY.**

A sniper must know these target indicators if he is to locate the enemy as well as prevent the enemy from locating him. These indicators are grouped into three general areas—sound, movement, and improper camouflage.

Sound can be made by movement, equipment rattling, or talking. The enemy may dismiss small noises as natural, but when someone speaks, he knows for certain someone is near. Silencing gear should be done before a mission, so that it makes no sound while running or walking.

### SOUND

The sniper must move by slow, smooth, deliberate movements, being conscious of where he puts his feet and how he pushes aside brush to move through it.

The human eye is attracted to movement. A stationary target may be impossible to locate, a slowly moving target may go undetected, but a quick or jerky movement will be seen quickly.

### MOVEMENT

A sniper must be able to move undetected while under observation of optical equipment. *Again, slow, deliberate movements are needed.*

A large number of targets will usually be detected by improper camouflage. They are divided into three groups:

### IMPROPER CAMOUFLAGE

**SHINE.** Shine comes from reflective objects exposed and not toned down. The lenses of optical gear will reflect light. This can be stopped by putting a paper shade over the end of the optics and by staying in shadows. Any object that reflects light should be camouflaged.



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**OUTLINE.** The outline of items such as the body, head, rifle, or other equipment must be broken up. Such outlines can be seen from great distances. Therefore, they must be broken up into features unrecognizable, or unnoticeable from the rest of the background.

When using a position for concealment, a background should be chosen that will absorb the appearance of the sniper and his gear. Contrast means standing out against the background, such as a man in a dark uniform standing on a hilltop against the sky. A different color or shape from the background will usually be spotted. Therefore, a sniper must use the coloring of his background and stay in shadows as much as possible.

## CONTRAST WITH BACKGROUND

## TYPES OF CAMOUFLAGE

### STICK CAMOUFLAGE

In using stick camouflage, all the exposed skin should be covered, to include the hands, back of the neck, ears, and face. The parts of the face that naturally form shadows should be lightened. The predominate features that shine should be darkened, such as the forehead, cheeks, nose, and chin.

The pattern and coloring that should be used is one that will blend with the natural vegetation and shadows. For jungle or woodland, dark and light green are good. White and gray should be used for snow areas, and light brown and sand coloring for deserts.

### PATTERNS

The types of facial patterns can vary from irregular stripes across the face to bold splotching. The best pattern, perhaps, is a combination of both stripes and splotches. What one does not want is a wild type design and coloring that stands out from the background.

### CLOTHING—GHILLIE SUIT

The ghillie suit is a camouflage uniform or outer smock that is covered with irregular patterns of garnish of blending color. Strips of garnish are folded in half and sewn mainly on the back, legs, arms, and shoulders. Then the strips are frayed or cut longways to give the suit the appearance of vegetation. The suit can also incorporate a close-mesh netting sewn to the back of the neck and shoulders, and then draped over the head to form a veil. The veil is used while in position to break up the outline of the head, hide the rifle scope, allow movement of the hands without fear of detection, and conceal the



Figure 4-4. Ghillie Suit, Front View.



Figure 4-5. Ghillie Suit, Back View.

ejection of brass. The veil, when draped over the head, should come down to the stomach or belt and have camouflaged garnish tied in it to break up the outline of the head and the solid features of the net. When the sniper is walking, he pushes the veil back on his head and neck so that he will have nothing obstructing his vision or hindering his movements. The veil is, however, worn down while crawling into position or near the enemy.

The ghillie suit does not make one invisible. A sniper must still take advantage of natural camouflage and concealment. Small loops should be sewn to the suit to hold natural vegetation, such as grasses and other vegetation that will not wilt quickly.



Figure 4-6. Sniper (Prone) in Ghillie Suit, Head Veil Up.

***WHEN WEARING THE GHILLIE SUIT, THE SNIPER WOULD CONTRAST WITH REGULAR TROOPS, MAKING HIM A PRIME TARGET, SO IT SHOULD ONLY BE WORN WHEN THE SNIPER IS OPERATING ON HIS OWN.***

#### FIELD EXPEDIENTS

If the desired components for the construction of a ghillie suit are not on hand, a makeshift suit can be made by expedient measures.

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Figure 4-7. Ghillie Suit Using Canvas and Burlap With a Field Cover.

The garnish can be replaced by cloth discarded from socks, blankets, canvas sacks, or any other material that is readily available. The material is then attached to the suit in the same way. What is important is that the texture and outline of the uniform are broken up. The cloth or any other material can be varied in color by using mud, coffee grounds, charcoal, dye, or paint. Oil and grease should not be used because of their strong smell. Natural foliage helps greatly, when attached to the artificial camouflage, to blend in the suit with the background. As the foliage grows old, or the terrain changes, it must be changed on the suit. A normal field cover can be camouflaged with garnish or a garnish substitute (when netting is not available) to break up the outline of the head.

## CAMOUFLAGING EQUIPMENT

One of the objects of primary concern for camouflaging is the rifle. One has to be careful in camouflaging the rifle to ensure that the operation of the rifle is not interfered with, that the sight is clear, and that that nothing touches the barrel. Camouflage netting can be attached to the stock, scope, and sling, then garnish tied in the netting to break up their distinctive outline. The stock and barrel can be painted for special terrain, such as snow and desert areas. The M16 can be camouflaged in the same way, ensuring that the rifle remains fully operational.

### RIFLE

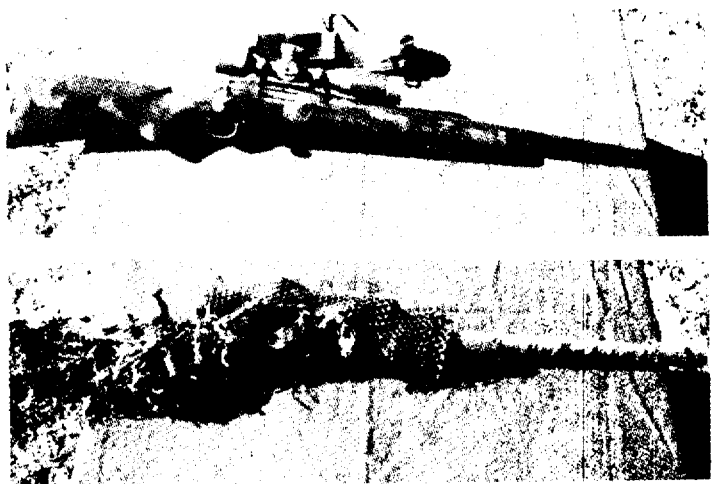


Figure 4-8. Plain Rifle vs Camouflaged Rifle.

Optical gear such as the M49 scope and binoculars are camouflaged in the same manner. The M49 and stand is wrapped or draped with netting and then garnish is tied into it, making sure that the outline is broken up and that the colors blend in with the terrain. The binoculars are wrapped with netting to break up their distinctive form. Since glass reflects light, a paper hood can be slipped over the objective lens on the scope or the binoculars.

#### OPTICAL EQUIPMENT



Figure 4-9. M49 and Binoculars, Camouflaged.

#### PACKS AND WEB GEAR

Web gear can be camouflaged by dying, tying garnish to it, or attaching netting with garnish. The pack can be camouflaged by laying a piece of netting over it, tied at the top and bottom. Garnish is then tied into the net to break up the outline. Natural vegetation should also be used when possible, but not in excess, because of noise, movement, and wilting.

Naturally, one type of camouflage can not be used in all types of terrain and geographic areas. Before operations in an area, a sniper should study the terrain, vegetation, and lay of the land to determine the best possible type of personal camouflage.

#### CAMOUFLAGE IN DIFFERENT GEOGRAPHIC AREAS

In areas with heavy snow or in wooded areas with brush covered with snow, a full white camouflage suit, possibly with gray shading, is worn. With snow on the ground and the brush not covered, white trousers and green-brown tops are worn. A hood or veil in snow areas is very effective, and equipment should be striped or totally covered in white. In snow regions, visibility during a bright night is nearly as good as in the day, giving snipers full-time capabilities, but movement must be undertaken along carefully concealed routes. Firing positions can be made almost totally invisible if selected with care.

#### SNOW